The Refrigeration Service Engineer

OCT 15 1937
LIBRARY

Vol. 5
No. 10

OCTOBER • 1937

Jobbers with Local Stocks

Albany, N. Y.	Hoy & Co.
Allentown, Pa.	General Refrigeration Supply Co.
Atlanta, Ga.	J. M. Tull Metal & Supply Co., Inc.
Atlanta, Ga.	M. D. Patterson
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Chicago, Ill.	H. Channon Co.
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Chicago, Ill.	The Harry Alter Co., Inc.
Cincinnati, Ohio	The Merkel Bros. Co.
Cincinnati, Ohio	Williams & Co., Inc.
Cleveland, Ohio	The Harry Alter Co., Inc.
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Davenport, Iowa	Republic Electric Co.
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Denver, Colo.	Auto Equipment Co.
Detroit, Mich.	J. M. Oberc, Inc.
Detroit, Mich.	Borg-Warner Service Parts Co.
El Paso, Texas	Zork Hardware Co.
Flint, Mich.	Shand Radio Specialties
Fort Wayne, Ind.	H. J. Schroeder Co.
Ft. Worth, Tex.	McKinley Refrigeration Supply Co.
Greensboro, N. C.	Hasco, Inc.
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Hempstead, Long Island, N.Y.	Sid Harvey, Inc.
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Jacksonville, Fla.	Jamits Company
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Knoxville, Tenn.	Leinart Engineering Company
La Crosse, Wis.	W. A. Roosevelt Co.
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Long Beach, Calif.	L. B. Marsh
Los Angeles, Calif.	Refrigeration Service, Inc.
Los Angeles, Calif.	Refrigeration Parts Exchange
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Macon, Ga.	Lowe Electric Co.
Madison, Wis.	Gustave A. Larson Co.
Memphis, Tenn.	United Refrigerator Supply Co.
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Milwaukee, Wis.	Chase Brass & Copper Co., Inc.
Milwaukee, Wis.	Refrigeration Specialty Co.
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Minneapolis, Minn.	Refrigeration & Industrial Supply Co., Inc.
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New Orleans, La.	The Spangler Co.
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New York, N.Y.	The Harry Alter Co., Inc.
Norfolk, Va.	Noland Co., Inc.
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Philadelphia, Pa.	Victor Sales Corporation
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Vancouver, B. C., Canada	Fleck Bros., Ltd.
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Waterloo, Iowa	Winterbottom Supply Co.
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Wilkes Barre, Pa.	Radio Service Co.
Winnipeg, Manitoba, Canada	Railway & Engineering Specialties, Ltd.
Worcester, Mass.	Standard Supply Co.

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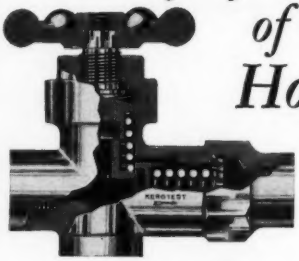
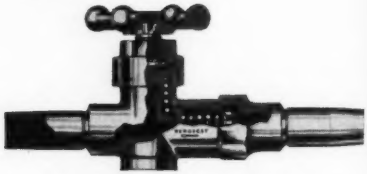
The Safety Valves of the Hour!





KEROTEST
PRESSURE RELIEF VALVES

Approved by many Municipal Codes

MANY of the systems you now service need approved pressure relief valves or fusible fittings to meet municipal safety codes now in effect. Two of the numerous Kerotest Safety Valves now in demand by service engineers are the combination Manual and Automatic Pressure Relief Valves Types 787 and 788 here illustrated.

These valves are available in six initial leak pressures ranging from 135 to 300 lbs. per square inch. Each rating is accurately set, individually tested at the factory and comes to you ready to install. No adjustment is required whatsoever.

For convenience in installation, a mounting flange is made directly on the body. Types 787 and 788 are available with $\frac{3}{8}$" or $\frac{1}{2}$" female pipe connections or $\frac{5}{8}$" O.D. Solder Connections. Ask your local Kerotest Jobber listed at the left to supply you with these valves of the hour.

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REGISTERED U. S. PAT. OFF.

KEROTEST MANUFACTURING CO.
PITTSBURGH, PA.

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November 3-4-5

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FOURTH ANNUAL REFRIGERATION SERVICE ENGINEER CONVENTION STEVENS HOTEL CHICAGO

JOHNSON

HULSMAN

WE ARE EXPECTING TO SEE YOU AT THE BIG PEERLESS DISPLAY IN BOOTHS 11 AND 12

COME — SEE — LEARN

The forthcoming R. S. E. S. Convention will be by far the best ever held. Don't fail to attend—you'll see more—learn more—and have a better time than ever.

We want you to visit our exhibit in booths 11 and 12 where the complete PEERLESS line of refrigeration low-sides and valves will be on display, including some entirely new products that have never been shown before.

DON'T MISS THIS CONVENTION

PEERLESS of AMERICA INC.

ESTABLISHED IN 1912 AS THE PEERLESS ICE MACHINE COMPANY

NEW YORK FACTORY	MAIN FACTORY—GENERAL OFFICES	PACIFIC COAST FACTORY
43-20 34TH STREET	515 WEST 35TH ST.	3000 SOUTH MAIN STREET
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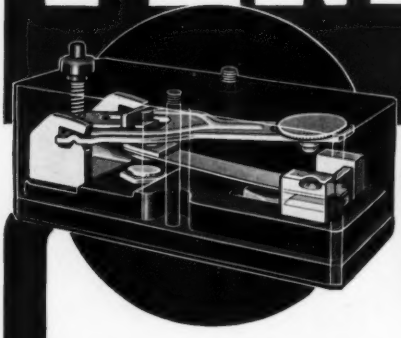
BUY PEERLESS FOR PERFORMANCE

A Pint's a Pound the world 'round

...and you can be just as sure of

PENN

REFRIGERATION CONTROLS



THIS TINY CONTACT UNIT WILL SAVE YOU TIME AND MONEY

Here is the standard Magneseal contact unit, interchangeable in any of the Penn 200 Series Refrigeration controls—Depend on Penn to lighten your service work . . .

IF YOU ARE INTERESTED IN THESE CONTROLS

ROOM THERMOSTATS

DOMESTIC REPLACEMENT CONTROLS

SEMI-COMMERCIAL CONTROLS FOR PRESSURE OR TEMPERATURE

HIGH PRESSURE SAFETY CUT-OUTS

WATER REGULATING VALVES

COMBINATION WATER REGULATORS AND HIGH PRESSURE SAFETY CUT-OUTS

LOW PRESSURE SAFETY CUT-OUTS

COMMERCIAL PRESSURE CONTROLS

COMMERCIAL TEMPERATURE CONTROLS

COMMERCIAL DUAL PRESSURE CONTROLS

COMMERCIAL DUAL TEMPERATURE CONTROLS

CONTROLS FOR REFRIGERATED TRUCKS

THEN—WRITE TO THE LEADER OF THE INDUSTRY

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PATTERSON, NEW JERSEY
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PENN ELECTRIC SWITCH CO.

OFFICES: New York, Boston, Detroit, Dayton, Moline, Chicago. EXPORT: 100 Varick St., N. Y. C. Distributors in Principal Cities. REPRESENTATIVES: Garland-Affolter Engr. Corp., San Francisco, Seattle, Portland, Los Angeles; Forslund Pump and Machinery Co., Kansas City; The Uhl Co., Minneapolis; Jules Beneke, St. Louis; Monarch Sales, Denver.

Now located in **GOSHEN, INDIANA**

SEE YOU AT Booth "52"

AT THE

REFRIGERATION SERVICE ENGINEER SOCIETY

CONVENTION

We have enjoyed your business during the past year and now we are looking forward to meeting YOU—the man who has helped us to prove to the world that WOLVERINE Seamless Copper Refrigeration Tubing is THE tubing for the job.

WOLVERINE

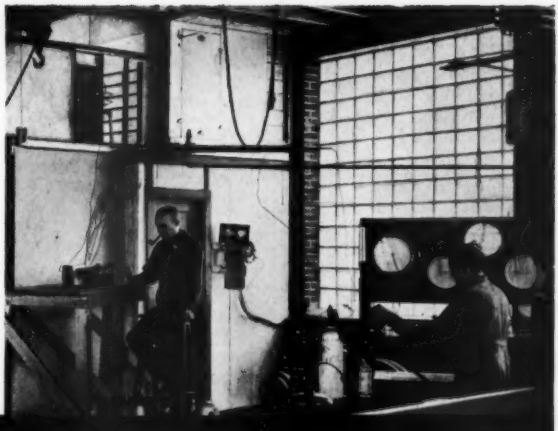
TUBE COMPANY

1415 Central Ave. • Detroit, Michigan

"Distribution Check"

"PASS NUMBER"

"One 38.9°"
"Two 39.0°"
"Three 38.95°"
"Four 38.85°"
"Five 38.8°"
"Six 38.9°"



and Another **ALCO TEST**
OF EVAPORATOR EFFICIENCY
IS UNDER WAY . . . . . .

REFRIGRANT CONTROL, under varying load conditions, is checked every hour for weeks—every 15 minutes for days—every 5 minutes for hours—to find the consistency of operation, and the proper valve application.

The liquid and suction lines are tested for size and arrangement—the efficiency of the distributor header checked—suction manifolds and remote bulb applications compared and arranged for the most efficient control. The ALCO engineering department has tested over 200 types and styles of evaporators and coolers. Frequently their efficiency and capacity has been improved—as much as 25 to 100%.

The results of these tests have furnished the data needed to determine the correct THERMO Valve application. Every ALCO Engineer and Field Representative has an accurate knowledge of the characteristics of most standard evaporators.

Take advantage of their experience and information—both laboratory and field—

Consult an ALCO Engineer for Engineered Refrigerant Control

ALCO VALVE CO., INC.
2630 Big Bend Blvd., St. Louis, Mo.

MAKING FRIENDS

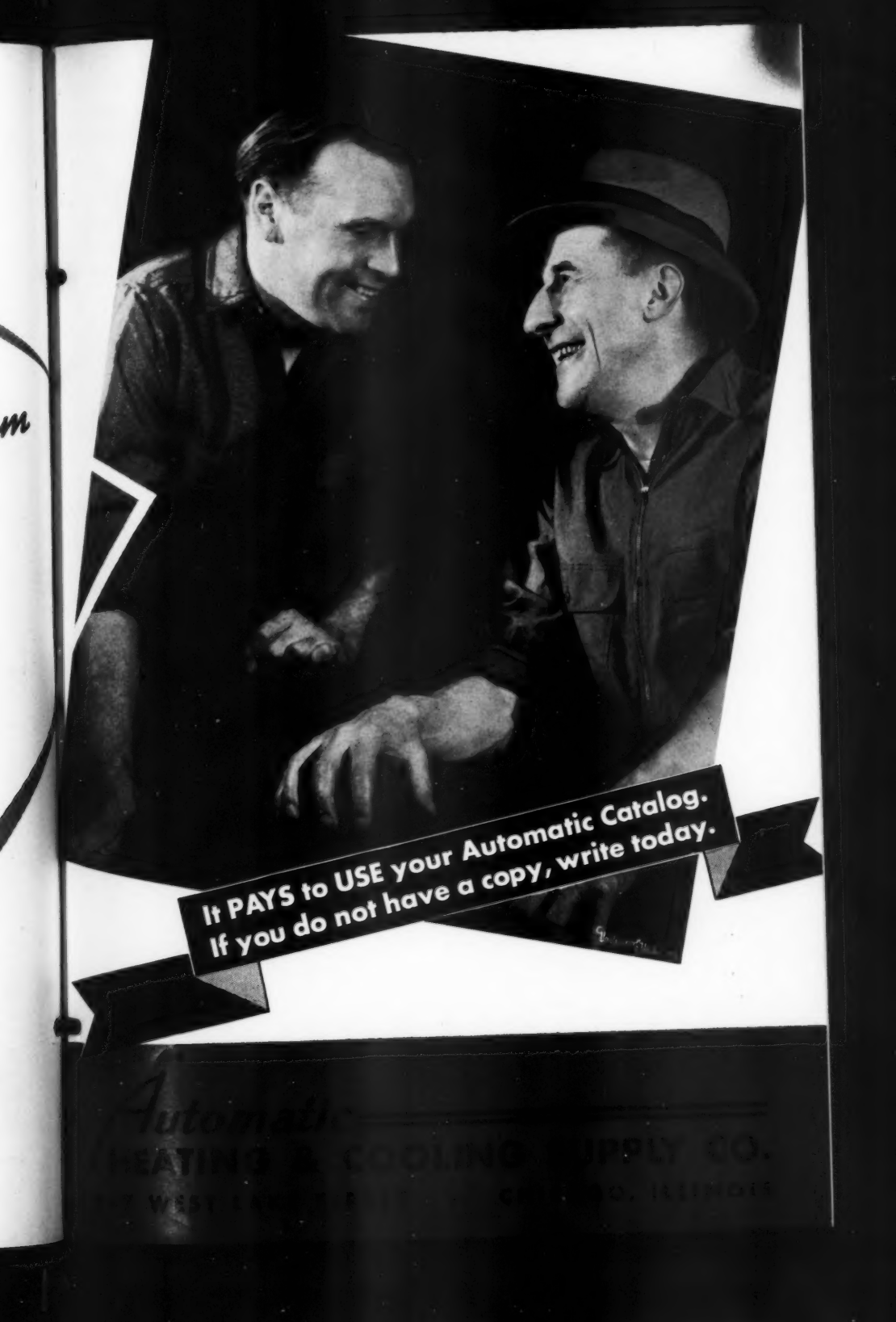
—and holding 'em

Less than a year ago, Automatic received its first order. An infant then, it has grown to maturity in a single season. To all who contributed to this success, we express deep gratitude.

Our customers are our friends. Nothing is more important than holding their good will. When this business was founded, Friendship was the cornerstone—Friendship that lasts because it's sincere; Friendship expressed in terms of sound trade practices, fair prices, complete stocks, prompt shipments and a real appreciation of the problems facing servicemen and contractors on the job.

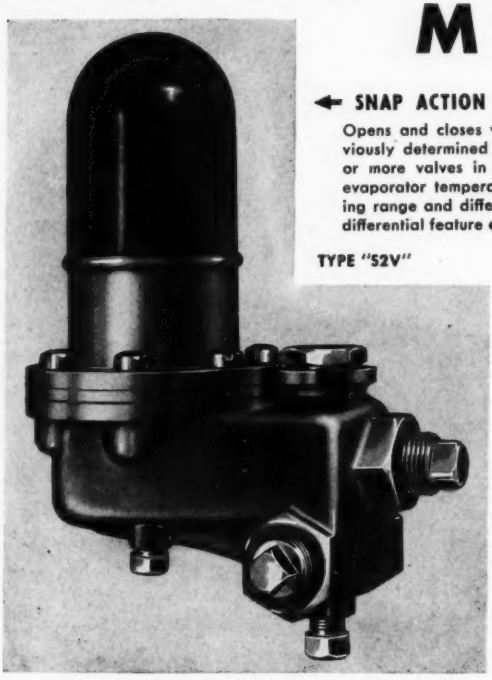
That this policy continues to pay goes without saying. It just seems that its human nature to react favorably under the stimulus of trying to be fair and friendly in business.

BOOTH
No. 19
R.S.E.S. Convention


It PAYS to USE your Automatic Catalog.
If you do not have a copy, write today.

STANDARD REFRIGERATING APPLIANCES

PRODUCTS of recognized MERIT



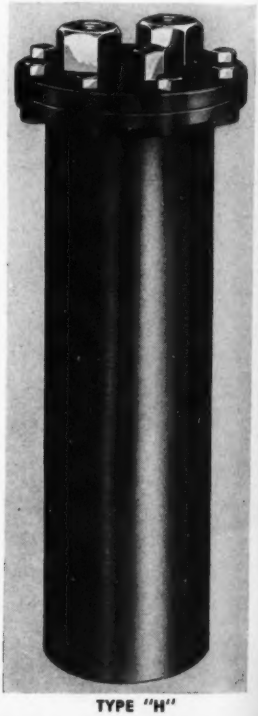
← SNAP ACTION MULTIPLE TEMPERATURE VALVE

Opens and closes with a positive snap action at any previously determined settings within its limitations. With two or more valves in the same multiple system the different evaporator temperatures are maintained merely by adjusting range and differential of the several valves. Adjustable differential feature exclusive. Write for Bulletin No. 17.

TYPE "S2V"

OIL SEPARATORS
WITH AUTOMATIC OIL RETURN →

Consists of a steel shell sufficiently large to retard gas velocity and partially remove the sensible heat of compression. Oil-laden discharge gas from compressor passes through an efficient oil-scrubbing device which absolutely assures every atom of gas and oil impinging itself on an oily metal surface before it can leave oil separator. Write for Bulletin No. 14.



TYPE "H"

Our exhibit booth at the convention Refrigeration Service Engineers' Society, Chicago, November 3-4-5, will be **BOOTH No. 29.**

AMERICAN INJECTOR COMPANY
RILEY ENGINEERING CORP. *Associate*
1481-14TH ST. • *Phones* LAFAYETTE 0350-0552 • DETROIT, MICH.

★ FORGED BRASS *and* WROUGHT COPPER FITTINGS

★REFRIGERATION
★AIR CONDITIONING

● The use of STREAMLINE Solder Fittings assures permanently tight connections for electric refrigeration and air conditioning work. They are absolutely refrigerant and seep-proof. Vibration cannot work them loose. They form a connection actually stronger than the tubing—yet much lighter and more quickly completed, and they reduce materially your fitting cost.

A WORD OF CAUTION—all solder type fittings are not STREAMLINE. The genuine STREAMLINE Solder Fitting is manufactured by the Mueller Brass Co., Port Huron, Michigan, and certain reliable concerns who hold a License under Mueller Brass Co. Patents.

The service man will find STREAMLINE Fittings more profitable for him to handle and much more satisfactory to install. It is the only solder fitting that possesses the true visual inspection feature of a leak-proof connection.

WHEN YOU ORDER STREAMLINE FITTINGS, MAKE CERTAIN THAT THAT IS WHAT YOU ACTUALLY GET.

Send for our Catalog and Price List showing the most complete line obtainable of Valves, Fittings and Accessories for Refrigeration work. Order through your jobber—he stocks the complete line.

MUELLER BRASS CO.

PORT HURON, MICHIGAN

STREAMLINE

TRADE MARK REG. U.S. PAT. OFFICE

COPPER PIPE AND FITTINGS

Will be waiting to see you at Booth 10—R. S. E. S. Convention

YOUR JOB AND OURS

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

We extend to the 4th Annual Convention of the Refrigeration Service Engineers Society our heartiest congratulations! It marks another milestone toward greater recognition for the job you are doing, through refrigeration, to safeguard the health and comfort of the American public. We like to think we have helped you do that job by carrying in all our ten branches a complete stock of the newest and best in refrigeration supplies. We're proud to consider ourselves your partners in a job that's well worth doing.

MELCHIOR, ARMSTRONG, DESSAU CO.

of Delaware, Inc.

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Brooklyn
Harrisburg
Newark
Washington

REG. U. S. PAT. OFF.
FOR REFRIGERATION

Philadelphia
Boston
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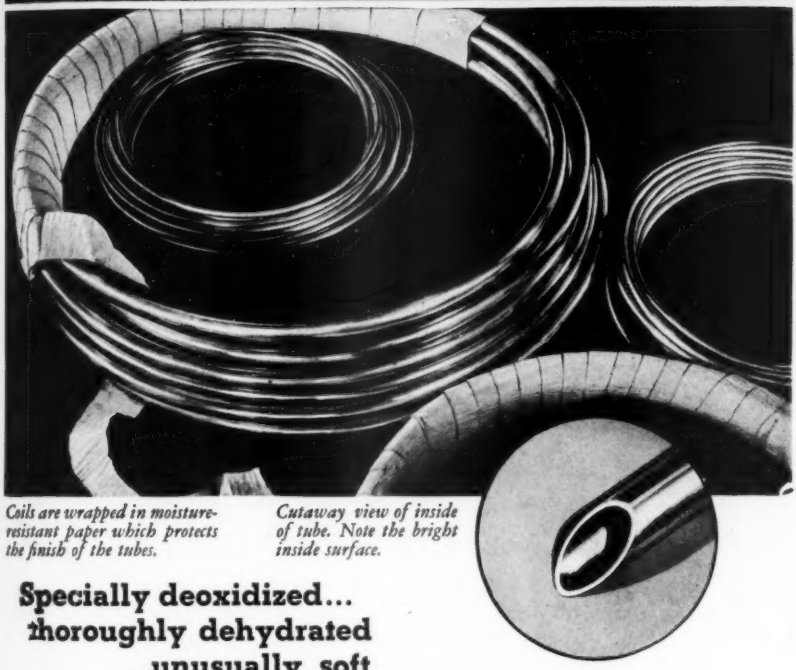
Hartford
Rochester

ANACONDA COPPER REFRIGERATOR TUBES



Coils are wrapped in moisture-resistant paper which protects the finish of the tubes.

Cutaway view of inside of tube. Note the bright inside surface.

Specially deoxidized... thoroughly dehydrated ...unusually soft

There are three outstanding reasons why Anaconda Copper Refrigerator Tubes enable you to do a first-class installation job.

1—**Deoxidized.** Anaconda Copper Refrigerator Tubes are *specially* deoxidized to increase their corrosion resistance.

2—**Dehydrated.** These high quality tubes are thoroughly dehydrated. They are manufactured according to A. S. T. M. specifications by methods which assure *unusually bright, clean inside surfaces.*

3—**Soft.** Then, too, Anaconda Copper Refrigerator Tubes are unusually soft. They may be easily bent and will *flare without cracking.*

The leading refrigerator manufacturers' specifications for tubes to be used in the installation work are met by Anaconda Copper Refrigerator Tubes. When *you* install them, you give the purchaser full value. The result is increased good-will for your business.

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Anaconda Copper Refrigerator Tubes are carried in stock by leading distributors of refrigerator parts.

ANACONDA
from mine to consumer

26418A

FRENCH SMALL TUBE *Branch*

THE AMERICAN BRASS COMPANY · *General Offices:* WATERBURY, CONN.

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And here is a SPECIAL invitation: When you visit the Convention, make the Ranco Exhibit your headquarters. Our booth is easy to find. "Right through the main gate"—turn to the left—and there you are! See how Rancos are built. See the world's most complete line of Exact Replacements. See all that is newest and best in Domestic Refrigerator Thermostats and Commercial Controls!

The "Ranco gang" will be on hand to greet you throughout the entire first week of November—at the Stevens Hotel, Chicago.

Ranco INC. Columbus, Ohio

The Refrigeration Service Engineer

Vol. 5 No. 10

October 1937

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

Official Organ
REFRIGERATION SERVICE ENGINEERS SOCIETY

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VISIT OUR BOOTHS 34 AND 45
AT CHICAGO

14 TESTS *Guard*

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The Refrigeration Service Engineer

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The Convention Special

EXTRA

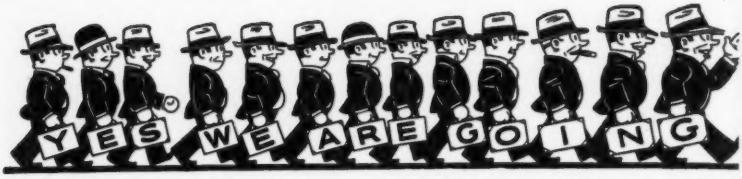
"I'M Jake." "I'm Joe." We are the two guys who have been going all over this country, in and out of some of the funniest places you ever saw, advertising this convention that everyone is talking about. Yes, sir! We have been advertising high, wide and handsome, but the funny part about it is that we didn't know what it was all about until very recently. Realizing our ignorance in the nick of time, and the predicament we were likely to get into through such lack of knowledge, we decided it was time to educate ourselves.

Securing a list of the convention committee heads, together with a picture of these men so that we could recognize them on sight, we started out.

We decided to report to our Boss first—Mr. Irving Alter. He is in charge of the Publicity Committee, and is the one who has been making us work so hard. "How are we doing, Irv?" we asked him, and he said, "Boys, you have done a good job. Through the cooperation of your endurance and my brains, I don't think there is a man, woman or child in the whole country who is in way interested in refrigeration who does not know all about the coming convention, and is planning to attend. In fact, the population of Chicago is expected to increase to such an extent during the week of November 3-4-5 that we are contemplating the building of a fence along the lake to prevent people from being crowded into it."

Wow! What do you know about that. Well, we immediately hot-footed it over to Mr. H. W. Blythe, who is in charge of the Reception Committee, to find out how he was going to receive all these people.

Mr. Blythe agreed that it was going to be a big job, but he said, "We have it all planned. Of course, we expect that a good many of our visitors will drive and will be seeking directions, so in order that they will



have no trouble, all our state and city police have been instructed to keep an eye open for them. Just as soon as a foreign license is seen on the road, a motorcycle policeman will fall in alongside to act as your personal escore to the Stevens. No questions will be asked, because he will know that if you are from out of town, you must be going to the Convention. At the railroad station, it will be much simpler. Every redcap has received special instructions, as an official greeter. He will shake you by the hand and call you by your first name, and before you know it, he will have transferred you and your baggage to a predetermined gathering place for those arriving at that hour. You will recognize it by the brass band, which, when the parade begins, will lead you to the Stevens Hotel. On arriving at the hotel, you will be met by the greatest army of handshakers you have ever seen. Yes, sir! We are proud of this unit. If you care to see them in advance, you can do so at their Summer Handshaking-Training Camp."

ONE OF THE GREETERS

Well, the situation seems well in hand so far. But what are these people going to do when they get here? Apparently Mr. B. B. Dawes is the man to answer that one, since he is in charge of the Program Committee, so we looked him up.

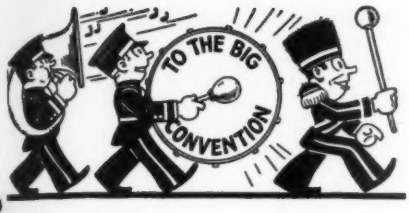
Mr. Dawes informed us that he was sorry he could not show us a program, because it was not printed yet, but, of course, we realized after his explanation that this was excusable since that is always the last thing to do so that last-minute changes may be accommodated. The only thing that seemed to be bothering Mr. Dawes was whether to print it in one or two volumes, and whether it should be bound in leather, or in just a plain binder.

Then we decided to visit Bill Hauber, of the Housing Committee. In answer to our query, Bill said, "After the handshakers get through with our visitors, we are going to see that all visitors get proper room accommodations, according to their ability to spend. It may surprise you to know that we have already arranged for accommodations ranging all the way from and including the Royal Suite, at $100.00 per day, to a triple-decked bunk, where you may obtain a first-class bed and breakfast for just one dime, folks—just one dime."

We found ourselves by this time in the vicinity of Herman Goldberg's office, so we dropped in to rest our weary feet. We found Mr. Goldberg sitting at his desk, gazing out of a window, with the most worried expression you ever saw. "What's the trouble, Herman? Why so dejected?" we asked. "Boys," he said, "it's terrible. Frankly, I am worried. Do you realize that during the week of November 3-4-5 there will not be a serviceman left in the country, outside of Chicago? No, sir! Not one single serviceman. Just think of it! Think of the poor little innocent babies who won't have cold milk to drink, and think of the hardship to the cocktail parties without ice cubes. Just think of it! Why, it makes me feel like weeping. Furthermore, I just got another job handed to me. Because all the servicemen of the country will be in one place, the Bureau of Statistics has asked that we take a census at this time. Can you imagine that? Counting sheep couldn't be worse."

Herman—Worried

We still hadn't found out how all these people were going to be entertained for three days, so looking over our list of committeemen, we found that Mr. George Mon-



jian was in charge of entertainment.

George didn't seem so well pleased for some reason, and upon questioning, here is what he told us.

"Can you imagine such luck? Here I was all set to have Sally Rand on our program, and just at the last minute, I find out that she has a previous engagement for those dates. We can't disappoint our members though, so we will have to find someone to take her place. The ladies are not going to be disappointed, either. No, sir! When they see Robert Taylor on our program, they will have something to remember for a long

Ladies—Look
Robert Taylor

WHERE IS THE FAN DANCER?

time. Are we going to eat? You said it. Can you imagine a huge, beautiful banquet room, about a block square, filled with people with napkins tucked under their collars, waiting eagerly for the food to be brought on? Can you imagine the food capacity of such a room full of servicemen and their friends? Just to give you a rough idea, we have contracted for the entire output of the U. S. Stockyards for the three days of the convention. Yes, we realize that the rest of the city is going to be hungry, but we can't help it. The servicemen must be served."

Loosen your belts boys—we are going to eat

We sneaked in on Harry Drownes unnoticed, and caught him at his desk, mumbling to himself. "One mill-yun— Two mill-yun— Three—." "What are you doing, Harry?"

Well, it turned out that Mr. Drownes is in charge of the Auditing Committee, and we had caught him in the act of figuring out how much money was going to be spent on this convention. "Of course," he said, "we hope to have a little money left over after this fray, but if we don't, we won't worry. Money is no object, and nothing is too good for the serviceman. Believe me, he will have everything that money can buy, and a lot more it can't buy."

It seemed as though we had missed something in connection with the manner in which these people were going to be entertained, and sure enough, after looking over our list, we had forgotten about the educational features.

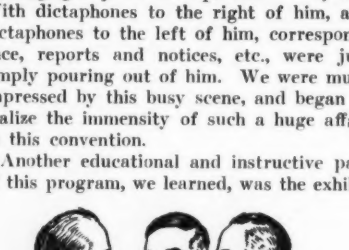
To the servicemen, this is very important, but, of course, not of much interest to the ladies. For some reason or other, they don't seem to need educating. However, we nosed around a little until we ran across Mr. H. L. Hendricksen and Mr. H. D. Busby, who seemed to be engrossed in a close conference.

We were informed that they were collaborating on the educational features of the program, and seemed to have everything pretty well in hand. The only hitch in the program to this point was the argument which had been going on when we came in as to who would give the official greeting. Harry wanted Jim Farley, but H. L. was holding out for Al Smith. We left the boys arguing it out, because we could see this was going to take time, and started on our way again.

We hadn't learned anything of the clerical end of this big job yet, it seemed, so we stopped in to see Mr. Willis Stafford, who, we learned, was not only secretary of the local chapter, but also of the convention committee. Well, sir, on arriving in Mr. Stafford's office, we were absolutely as-

tounded. The hammering, clacking roar of the typewriters of his staff of stenographers sounded more like a boiler factory than an office. Stretching our vocal cords to the limit, we finally found Mr. Stafford ensconced in his private office, amidst an encircling group of dictaphones. Yes, sir! With dictaphones to the right of him, and dictaphones to the left of him, correspondence, reports and notices, etc., were just simply pouring out of him. We were much impressed by this busy scene, and began to realize the immensity of such a huge affair as this convention.

Another educational and instructive part of this program, we learned, was the exhibit



GEO. FRANCK, RAY POLLEY, AND RAY JOHNSON IN CONFERENCE

section of the manufacturers and jobbers, etc., who were attending our convention. This sounded very interesting, so we looked up our old friends, Mr. George Franck, of the Manufacturers' Committee, Mr. Ray Johnson, of the Jobbers' Committee, and Mr. Ray Polley, of the Exhibitors' Committee. From our talk with these gentlemen, we received a pretty nice picture of what can be seen in such an outstanding display as this will be. Imagine, for instance, being able to see the production of copper, and its eventual manufacture into the copper tubing we use. Guides will be furnished for the tours of the copper mines, and special protection to your clothes from the flying sparks of the molten copper as it is made into tubing. This is only one of the highlights you will see in this section of the Stevens Hotel.

What a picture we had gathered so far, and what an affair this is going to be! Just think for a minute of the huge crowds, the brass bands, the army of handshakers, the celebrities on the entertainment program, the outstanding speakers on the educational features, the huge exhibits, and that is not all. No, sir! We have learned confidentially that the Ladies' Committee is arranging for the favors to be given to the visiting ladies. The only arrangement left to be completed in this matter is the transportation or shipment of the favors to the respective homes of the ladies. We are wondering if they are going to give pianos!

By the way, don't forget to see Mr. E. W. Scotten, who is in charge of the Registration Committee, when you arrive. If you miss him, we hear, you will miss getting your ticket to the big feed.

Mr. Fred Roth, of the Membership Committee, will probably try to talk you into joining the Society the first chance he gets, but if you wear your membership button in a prominent place on your person, you will be immune from him, and will not have to worry.

We had not yet seen Mr. Ivar Skipple, president of Chicago Chapter, or his Board of Directors. We were sure they could give us a very good picture of the affair, but we would have to wait to get these gentlemen all together at one of their meetings, so in the meantime, we stopped in to see Mr. H. T. McDermott, national secretary. Well, sir, it was the funniest sight you ever saw. H. T. and Miss Christensen, note book in hand, were all dressed up in shorts and sweat shirt, with short socks and gym shoes on their feet, dashing hither and yon—hurdling wastepaper baskets, dodging desks—here and there, all over the office. We had quite a time keeping up with them until we found out what it was all about.

It seems they have been doing this for the past couple of weeks—getting into trim, and training in the art of being everywhere at once at the convention.

We were getting pretty weary by this time and felt that we had learned enough. We had at least accomplished our purpose, and learned what this convention was all about, so decided to go home and just let our brain hang.

"I'm Jake"—"I'm Joe"—saying Au Revoir 'til November 3-4-5. We will be there to greet you!

PROGRAM OF
EDUCATIONAL FEATURES
ENTERTAINMENT
HOTEL RATES
APPEAR ON OTHER
PAGES

Chapter 2
Heating and Air Conditioning

By H. D. BUSBY

THIS is the second article on the subject of Heating and Air Conditioning, which is intended primarily to give the service engineer a working knowledge of heating, so that he may better prepare himself for the future home equipment which combines in one central plant, both heating and cooling equipment for summer and winter air conditioning. Also, that he may, if he so desires, build up his off-peak season by the addition of oil burner and stoker service.

It will be readily understood, of course, that it is impossible to treat this subject in its entirety through the columns of this journal, since to do so would require several years continuation. The subject is so large that several large volumes would be necessary to cover it completely. However, in the brief glossary we will give in this and succeeding articles, is contained the essential facts which it is hoped will give the serviceman the working knowledge he will require in the servicing of heating apparatus.

Heat Transmission

Due to the natural tendency toward equilibrium of temperature, there is always a transfer of heat between regions that are at different temperature levels. The flow of heat, of course, is always toward the lower temperature level. This heat transfer takes place by one or all of three ways:

1. *By radiation,* which can be defined as the transfer of heat from one body to another, at a lower temperature, without affecting the medium through which it travels. For example, the rays of the sun heat the earth without affecting the air through which the rays travel.

2. *By conduction.* The heat that travels between two bodies or parts of the same body that are in actual contact. As an example, if we heat one end of an iron bar, the other end becomes heated through conduction.

3. *By convection.* The heat transferred from one body to another by the use of a movable or circulating medium, such as water or air. For example, in our steam or hot water heating systems, heat is transferred from the burning fuel to the room to be heated through the medium of water or steam.

Thermal Conductivity

Thermal conductivity may be defined as the heat transfer factor which is equivalent to the B.t.u.'s conducted through a material one foot square by one inch thick per degree F. temperature difference per hour. For example, if we had two spaces, as shown in Fig. 2, at different temperatures as indicated, with a wall between, having a total area of one square foot, the B.t.u.'s leaking through that wall per hour would be known as the thermal conductivity of the material used.

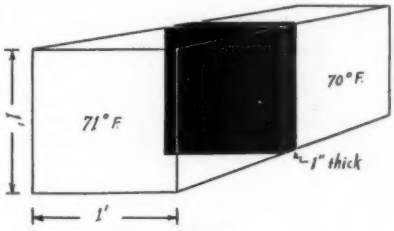


FIG. 2.

As may be seen, the rate of heat transfer from one region to another depends on four factors: the temperature difference, the area over which the temperature difference exists, the kind of material through which the heat passes, and the length of time involved.

Thermal Resistance

Determining the conductivity of any individual material is a process of test and experiment, and from the data published by the Bureau of Standards, we may find the heat leakage factor for almost any material used in building construction. Table 1 shows a few of the more important materials, and their heat leakage factors.

However, the mathematics involved in determining the heat leakage factor for a composite wall of several materials and air spaces becomes very lengthy and tedious

TABLE 1. THERMAL CONDUCTIVITY OF MATERIALS EMPLOYED IN BUILDING CONSTRUCTION

Material	C† Conductivity	Authority for Conductivity	Resistivity $R = \frac{1}{C}$	Resistivity of Commercial Thickness as Sold
Asbestos shingles	6.00	Peebles, Armour Inst.	.17	.....
Asphalt shingles	6.50	Peebles, Armour Inst.	.15	.....
Brick masonry	5.00	Univ. of Illinois	.20	.....
Brick veneer	5.00	.....	.20	4"—0.80
Concrete (1-2-4)	8.30	Univ. of Illinois	.12	.....
Concrete, cinder	5.20	Peebles, Armour Inst.	.19	.....
Concrete stone	6.30	Peebles, Armour Inst	.16	.....
Plaster (Gypsum)	2.32	Bureau of Standards	.43	½"—0.22
Plaster on wood lath	.....	.....	...	As applied 0.50
Plaster on metal lath	.....	.....	...	As applied 0.48
Roofings (built up bitumen and felt gravel or slag)	1.33	Univ. of Illinois	.75	As applied 0.19
Slate (Roofing)	10.37	.....	.10	½"—0.04
Stucco	8.00	Univ. of Illinois	.13	1"—0.13
Stone	12.0—14.0	Average	.08	.....
Sheet Metal	334	Lees	.003	Surface values only
Wood:				
Balsam	0.38	Bureau of Standards	2.60	.....
Cypress	0.67	Bureau of Standards	1.50	.....
Maple	1.10	Bureau of Standards	0.91	.....
Virginia Pine	0.96	Bureau of Standards	1.04	.....
White Pine	0.78	Bureau of Standards	1.28	.....
Wood flooring	.....	Values used in book	...	13/16"—0.81
Wood shingles	.....	Values used in book	...	5/8"—0.62
Wood siding	.....	Values used in book	...	5/8"—0.62

†C = B.t.u. per square foot, per inch thickness, per degree F. temperature difference, per hour.

when dealing with conductivity direct. In order to simplify the calculations determining a heat leakage factor for a composite wall, the term "Thermal Resistance" is used, which designates the reciprocal of Thermal Conductivity.

If we let R = Thermal Resistance, and C = Thermal Conductivity, the two may be expressed thus: $C = \frac{1}{R}$ or $R = \frac{1}{C}$.

In this manner, the resistance of each material in the wall can be determined together with other factors such as air films and air spaces, and the total sum of these becomes the total resistance of the wall. The reciprocal of this sum will become the heat leakage factor of the wall, or what is usually called the U factor.

Heat Leakage Factor

When a transfer of heat takes place from one region to another, such as the air in a room to a cooler region outside, three things will determine the heat leakage factor:

1. The inside air film through which the heat must pass before reaching the wall.

2. The material itself, which represents a certain resistance to the flow of heat dependent upon the kind of material and construction arrangements.

3. The outside air film, which causes a temperature drop.

When used collectively, these three factors represent a composite heat leakage factor for the wall in question.

This can be explained further by reference to Fig. 3, which is a section of a commonly used wall construction. The dotted line on each side of the sketch indicates an air film on the inside and outside of the wall. These films are designated as K_i factor for the inside wall, and K_o for the outside wall. Since the inside wall surface will be cooler than the air in the room, it is natural that the film of air next to the wall will be cooler than that some distance away. This represents a temperature drop and a resistance to the leakage of heat through the wall. Likewise, the air film next to the outside wall will be warmer than the outside air some distance away, and again represents a resistance to heat passing through the wall. This resistance, or K factor, for both inside and outside wall, will naturally vary considerably with the rate of air movement near it, and to the kind of surface of the wall. A rough wall with large air pockets

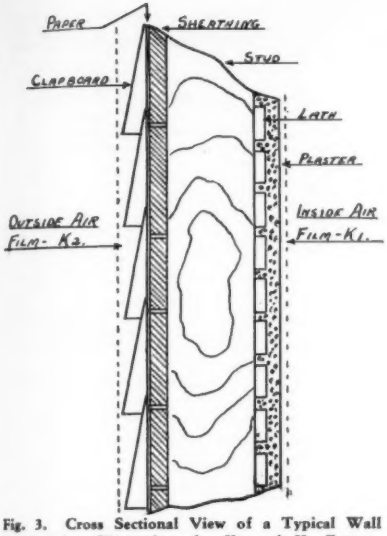


Fig. 3. Cross Sectional View of a Typical Wall Construction Illustrating the K_1 and K_2 Factors.

will, of course, hold a larger film of air. An increased air movement tends to decrease the air film, and likewise, the temperature drop.

Calculation of Leakage Factors for Combinations of Materials

Assuming we have two materials designated as X_1 and X_2, with the following characteristics:

1 inch of material X, with a thermal conductivity of 6 (C_1).

1 inch of material X_2 with a thermal conductivity of 12 (C_2).

The total conductivity (C_T) of the combination, exclusive of the K factor, would be equal to the reciprocal of the total resistance, which is equal to the sum of the individual resistances.

The resistance in the first case would be expressed as: $R_1 = \frac{1}{C_1}$ and in the second case as: $R_2 = \frac{1}{C_2}$.

The total resistance of the combination would be expressed as follows:

$$R_T = R_1 + R_2 = \frac{1}{C_1} + \frac{1}{C_2}.$$

Converting to total conductivity, we will have:

$$C_T = \frac{1}{R_T} = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2}} = \frac{1}{\frac{1}{6} + \frac{1}{12}} =$$

4 B.t.u. per hour per degree F. temperature difference per square foot of surface.

Figuring the conductivity for any thickness of material exclusive of the K factors, we will assume we have:

2 inches of material X_1 with a thermal conductivity of 6 (C_1).

3 inches of material X_2 with a thermal conductivity of 12 (C_2).

$R_1 = \frac{1}{C_1}$ for one inch, or $\frac{2}{C_1}$ for two inches.

Therefore $R = \frac{X_1}{C_1}$.

$R_2 = \frac{1}{C_2}$ for one inch, or $\frac{3}{C_2}$ for three inches.

Likewise $R_2 = \frac{X_2}{C_2}$.

Total resistance will then be:

$$R_T = R_1 + R_2 = \frac{X_1}{C_1} + \frac{X_2}{C_2}.$$

Using the reciprocal of these for the total conductivity we have:

$$C_T = \frac{1}{R_1 + R_2} = \frac{1}{\frac{X_1}{C_1} + \frac{X_2}{C_2}} = \frac{1}{\frac{2}{6} + \frac{3}{12}} = \frac{12}{7}$$

= 1 5/7 B.t.u. per hour per degree F. temperature difference per square foot of surface.

Including K Factor in Calculations

Calculating the heat leakage factor for any thickness, including surface factors (K) we will assume we have:

2 inches of material X_1 with a thermal conductivity of 6 (C_1).

3 inches of material X_2 with a thermal conductivity of 8 (C_2).

Inside surface factor K_1 of 1.2.

Outside surface factor K_2 of 3.6.

Total resistance will be expressed thus:

$$R_T = \frac{1}{K_1} + \frac{X_1}{C_1} + \frac{X_2}{C_2} + \frac{1}{K_2}.$$

The total conductivity, or U factor, as it is commonly called, will be:

$$U = \frac{1}{\frac{1}{K_1} + \frac{X_1}{C_1} + \frac{X_2}{C_2} + \frac{1}{K_2}} =$$

$$\frac{1}{\frac{1}{1.2} + \frac{2}{6} + \frac{3}{8} + \frac{1}{3.6}} = 7.1 \text{ B.t.u.}$$

The preceding considerations, of course, are fundamental, and have been worked out merely as illustrative examples. Tables for the various wall, ceiling and floor constructions encountered in heating work have been compiled by the American Society of Heating and Ventilating Engineers. Through their cooperation in granting permission to use these tables, a reprint of them will appear in the next issue of THE REFRIGERATION SERVICE ENGINEER.

Classification of Heat Losses from a Building

Satisfactorily heating a building to the proper temperature after the pick-up load is disposed of, or the desired temperature is reached, can be described as a process of supplying sufficient heat to balance the amount of heat lost from the building. The heat lost from the building falls under three classifications, and must be calculated separately:

1. Radiation, conduction and convection losses through walls, glass, floor, ceiling, roof, etc.
2. Air leakage around cracks of windows and doors.
3. Ventilation when supplied in addition to natural infiltration of air.

Transmission of Heat from Fuel to Heating Plant

The same laws of heat transfer apply to the heating plant as apply to the heat loss calculations — the transfer taking place through the three means of radiation, conduction and convection. For example, referring to Fig. 4, showing a sketch of a typical boiler with oil burner installation, we note the flame is directed toward the back of the boiler and then upward toward the flue passages. Where the flame impinges on the boiler surface, we will have a transfer of heat by conduction. The heat rays from the flame transfer heat by radiation to all parts of the firebox, while the hot gases passing through the passages in the boiler transfer heat by convection and

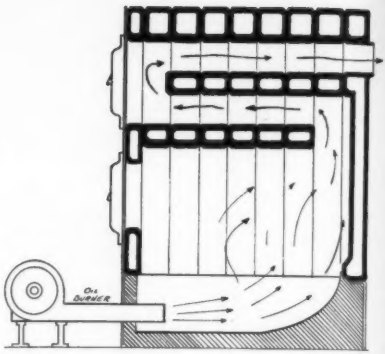


Fig. 4. Showing Flue Passages of Typical Boiler.

conduction, since a portion of the gases come in direct contact with the boiler surfaces. Boilers and furnaces are designed so that these means of heat transfer can be made use of in the most economical and efficient manner, so that the greatest amount of heat possible can be transferred from the fuel to the heating plant. Flue passages are made so that the gases will travel the longest, most tortuous passage available, thus bringing the greatest amount of gas possible in contact with the boiler surfaces.

Calculating the resultant conductivity of a solid wall composed of four inches of brick masonry, two inches of maple wood and ½ inch of plaster, proceed as follows:

Referring to tables, we find the thermal conductivities in question are:

Brick (X_1) per inch... $C_1 = 5.00$ $R_1 = .20$
Wood (X_2) per inch... $C_2 = 1.1$ $R_2 = .91$
Plaster (X_3) per inch.. $C_3 = 2.32$ $R_3 = .43$

Setting this up in the form of the fundamental equation, we have:

$$C_T = \frac{1}{\frac{X_1}{C_1} + \frac{X_2}{C_2} + \frac{X_3}{C_3}} = \frac{1}{\frac{4}{5} + \frac{2}{1.1} + \frac{\frac{1}{2}}{2.32}} = .352$$

In this case, of course, since the resistances were stated in the tables, the shorter method would be to use these factors direct as follows:

Brick = 4 × .20 = ... .80
Wood = 2 × .91 = ... 1.82
Plaster = ½ × .43 = ... .215
Total Resistance = 2.835

Total Conductivity would equal $\frac{1}{2.835} = .352$

(To be continued in November)

Balancing Cooling Coil and Condensing Unit

By GEO. H. CLARK,* B.S.M.E.

WE hear a lot of discussion with respect to various methods of selecting the proper cooling coils for an air conditioning system which would lead us to the belief that the choice of coils for an air conditioning job or comfort cooling job is an entirely different matter than the choice of cooling coils for a commercial refrigeration or domestic refrigeration system. This is entirely the case.

In household or commercial refrigeration the cooling coil is generally sufficiently large and the condensing unit has sufficient capacity so that the refrigerator being cooled could be cooled to temperatures much lower than those actually required.

For instance, in selecting cooling coils for a walk-in cooler we determine the maximum load on the particular refrigerator and then select our coils and cooling machine on the basis of 14 or 16 hours' operation of the machine per 24 hours. In other words, our cooling coil and condensing unit are both oversized so that we can have intermittent operation of the condensing unit.

Defrosting

In commercial refrigeration where we desire to operate our coils on a defrosting cycle it is necessary to have intermittent operation in order to obtain the low temperatures desired in the cooler and still be able to defrost our coils. This is, of course, accomplished by cooling our coils well below frost temperature in order to bring the cooler temperature to the desired minimum. We then cause our machine to stop and allow the coils to warm up to a temperature above frost temperature so that the coils entirely defrost during the off period.

In household refrigerators we operate our evaporators at temperatures below 32 degrees for the complete operating cycle so that we do build up frost on the evaporators which is periodically taken off during a defrosting period. In the case of household evaporators it is necessary to have the temperature of the evaporator below 32 degrees at all times in order to maintain a supply of ice cubes and to keep any frozen desserts in the frozen state; and, in general, the household machine has sufficient capacity so that if the machine were to operate continuously we could bring the temperature well down below the desired minimum so that we have intermittent operation of our machine in order that we may have plenty of reserve capacity when required.

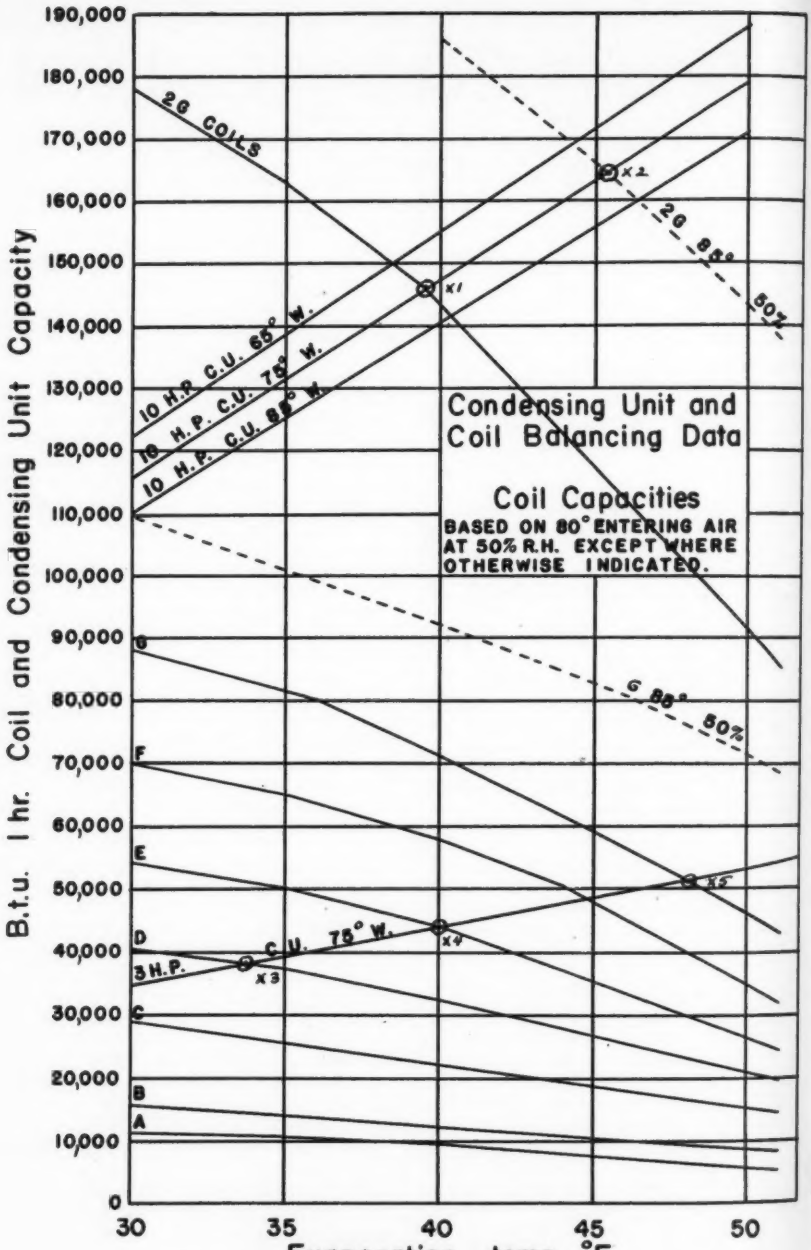
In air conditioning work, however, we plan on having our condensing unit operate continuously and in general we want to maintain an evaporation temperature somewhat above frost temperatures so that there will be no possibility of frosting our coils which with continuous operation would cause a restriction or stoppage of air flow through the coils. We do not want our evaporating temperature, on the other hand, to be too high or else the ability of the cooling coil to remove the latent heat from the air is greatly diminished.

Cold Water Cooling

Refrigeration as used in comfort cooling is usually preferable to cooling obtained by the use of cold water principally due to the fact that by being able to maintain lower coil temperatures we are able to obtain a greater amount of dehumidification. With cold water cooling, our water temperatures are generally not much below 55 degrees by the time the water gets to the cooling coil and naturally we could not hope to reduce our dew point quite to the inlet water temperature, so that mechanical refrigeration does a better job than water cooling if we maintain our evaporation temperature at the proper point.

There is a great deal of discussion as to how to remove sensible heat and latent heat in the proper proportion, but, as far as comfort cooling is concerned, I believe it is found that if we maintain our evaporation temperatures somewhere in the neighborhood

*Detroit School of Refrigeration, Chairman National Educational and Examining Board, R.S.E.S.



Geo. H. Clark, Weather Regulator Co., Detroit School of Refrigeration

FIG. I. DETERMINING PROPER BALANCE OF SYSTEM

of 40 degrees we obtain very good sensible cooling and latent cooling. Consequently, the problem of balancing the cooling coil with the condensing unit resolves itself into the selection of a coil which will give the desired evaporation temperature. This is very easily worked out by a system of curve intersections.

In the accompanying set of curves it will be noted that we have the cooling capacity of the cooling coils and condensing unit indicated along a vertical axis while on the horizontal axis we have evaporation temperatures listed.

If we refer to one coil manufacturer's catalog, we can find the capacity of one of their cooling coils based on an 80 degree dry bulb and 50 percent relative humidity air entering the coil. The air circulation is fixed in that the comfort cooling coil assembly is provided with the fan as a part of the unit so that there is no belting to be done which might vary the fan speed.

It must be noted that the capacity of the coils decreases as the evaporation temperature increases. To a great extent, of course, the capacity of the cooling coil to remove heat from the air varies as the difference in temperature between the refrigerant and the incoming air. If our evaporation temperature was as high as the incoming air temperature, naturally we would not get any cooling effect from our coil and as the evaporation temperature goes down, the difference between the incoming air and the coil temperature increases so as to increase the heat transfer from the air to the refrigerant.

Curve "A" shows how the capacity of the small size cooling coil of a particular manufacturer varies with evaporation temperature based on 80 degrees and 50 percent relative humidity incoming air. The coil manufacturer's data based on actual tests indicates capacities at 35 degrees, 40 degrees and 45 degrees evaporation temperatures.

Curves "B," "C," "D," "E," "F" and "G" show capacities of other cooling units manufactured by the same company. The "G" curve shows as a dotted line and with the figures 85 degrees and 50 percent indicates the capacity of the "G" coil if the incoming air temperature were increased to 85 degrees and the relative humidity were 50 percent. As the incoming air temperature and humidity go up, the capacity of the coil is increased as this also affects the difference between incoming air and evaporation temperature.

The capacity of the condensing unit is largely affected by the suction pressure and the incoming water temperature. As the suction pressure goes up, each cylinder full of gas comprises a greater weight of refrigerant than we have with low pressures. Also as the water temperature used in condensing goes down, we obtain lower discharge pressures and consequently the capacity of the condensing unit is increased.

In air conditioning work our condensers in general are working with very nearly a full flow of water. On our commercial refrigeration jobs in general the water valve throttles the water through in such a way as to just provide sufficient cooling. If the quantity of refrigerant pumped through is doubled due to an increase in suction pressure, our head pressure rises very slightly with the result that we increase our water flow considerably and thereby keep our head pressure from rising but a very few pounds. In air conditioning work, however, the machines are operating at very nearly full capacity all the while with the result that our water valve chiefly acts as a closed or open valve depending upon whether our machine is or is not operating.

High Suction Pressure

If our suction pressure is higher than normal so that we pump refrigerant through extra fast or if our inlet water temperature is extra high, our water valve cannot compensate for this as it is already wide open and cannot do anything more in furnishing water for condensing purposes. Consequently, the only way we can dispose of an extra amount of heat or get the same amount of heat in warmer water is to add sufficient heat to the water to warm it up to a higher temperature before it leaves the system which requires a higher condensing temperature and pressure. An increased head pressure will mean a decrease in volumetric efficiency and a slight slowing down of the compressor all of which decreases the capacity of the condensing unit.

On our curve sheet we have plotted three curves indicating the capacity of a 10-horsepower condensing unit with 65 degrees water, 75 degrees water and 85 degrees water available for condensing purposes. These curves indicate the change in machine capacity for evaporation temperatures from 30 degrees up to 50 degrees. In general we like to allow ourselves a little factor of safety either in our original calculations on the heat load in the building or else in the

size of equipment we furnish. In this case suppose we are to have a job which requires slightly more than 12 tons of refrigeration. If we figure our job pretty close, we find that we could use two coils of the "G" model and on our capacity curve we have plotted a composite curve showing the capacity of two "G" coils together. This is the sum of the capacity of the two coils.

If our cooling water is to enter the machine at a 75 degrees temperature, we find the intersection of our 10-horsepower condensing unit capacity curve at 75 degrees water temperature with our curve representing the capacity of two of the "G" size coils at the point labeled "X1." This point indicates the conditions we will have with these two "G" type coils connected to the 10-horsepower condensing unit under the conditions given. It shows if we trace this point horizontally that we will have a cooling capacity of slightly over 145,000 B.t.u. per hour. Since 144,000 B.t.u. per hour is 12 tons of refrigeration, this is slightly above the desired capacity. If we go vertically downward from the point "X1" to the bottom of our sheet, we find that our evaporation temperature is approximately 39.5 degrees which will give us a very good cooling and drying job.

Example

If our inlet air conditions should rise to 85 degrees and 50 percent relative humidity, we can find our operating conditions with this combination of coils and machine as indicated by point "X2." From this point horizontally we find a capacity of 164,000 Btu. at an evaporation temperature of 45.5 degrees. This will indicate an increase in capacity to somewhat over 13.6 tons of refrigeration so that as our temperatures are increased in the building being cooled the capacity of our machine and coils is increased.

On the other hand, if our inlet temperature and relative humidity conditions were reduced to a point lower than 80 degrees and 50 percent, the capacity of our coils and machine would be reduced. If the inlet temperatures were sufficiently reduced, the intersection of the coil capacity curves and the machine capacity curve would be at a temperature lower than 30 degrees, but before this condition was reached, the temperature and humidity conditions in the building would be lower than the desired comfort conditions and, consequently, we would want to discontinue the use of the cooling machine.

Cooling Coil Capacity

The capacity of any cooling coils connected to any condensing unit is bound to be equal to the capacity of the condensing unit. If the capacity of the coil to remove heat from the air is less than the capacity of the machine to remove heat from the coils the temperature of the coils will be reduced. This will increase the capacity of the coil and as the evaporation temperature and pressure is reduced, it will decrease the capacity of the condensing unit so that eventually the capacity of the coil will be increased and the capacity of the machine decreased until the two are equal.

Even if we were to connect a one-horsepower machine to a household refrigerator, the capacity of the coil at the refrigerator would equal the capacity of the machine provided the float valve or thermostatic expansion valve would properly regulate the flow of refrigerant. In this case, however, the coil capacity would be greatly increased due to the fact that the evaporation temperature would go down very low, possibly to —60 degrees or —70 degrees while the capacity of the condensing unit would be very much decreased due to the low suction pressure and consequently the large volume of gas per pound of refrigerant.

Correct Data

This method of balancing the coil with the condensing unit can be worked out very nicely as long as the information furnished by the condensing unit manufacturer and cooling coil manufacturer is reliable. On the same sheet we have shown the capacity curve of a three-horsepower condensing unit using 75 degrees inlet water. The capacity of this machine when used with three different coils is indicated by points "X3," "X4," "X5." When the three-horsepower machine is used with coil "D," the capacity is found to be about 38,000 B.t.u. per hour and the evaporation temperature just under 34 degrees.

When the machine is used with coil "E," the capacity of the machine is increased to 43,500 B.t.u. per hour and the evaporation temperature will be 40 degrees. If we used one of the "G" coils with this machine, the capacity is indicated as being 50,500 B.t.u. per hour and the evaporation temperature 48 degrees.

(Continued on Page 82)

Air Conditioning in the Automobile

FOR quite some time, we have heard rumors from here and there of experiments being made on air conditioning of cars, but now we have an experiment being made right here in our home town by one of our well-known independent operators.

Mr. Arnold Schroeder, of Rex Refrigeration Service, Inc., has installed a system in his Dodge, on which he is gradually gathering some interesting data, and learning some of the difficulties encountered in such a venture.

The system consists of a two-cylinder Tecumseh compressor, mounted on top of the motor, driven through two countershafts from the fan belt on the motor. The two countershafts were found necessary to reduce the speed from the maximum 5000 r.p.m. of the motor to the 700 r.p.m. of the compressor. Available space under the hood of the car would not permit a more direct reduction in speed, due to the large size of pulley that would be necessary. The condenser and receiver is installed between the radiator and the front grill, where an adequate air circulation is available at all times. The evaporator, with two small fans operating off the battery, is installed under the dash behind the steering column. An automatic expansion valve, installed under the hood near the dash, completes the system. Tubing connections are made from the compressor with flexible hose.

Control of the unit is obtained through the hinged lower countershaft. Swinging this shaft outward by means of a control from the dash causes the pulley to contact the fan belt, thus starting the compressor. Swinging the pulley in toward the motor stops the compressor.

Mr. Schroeder states that within three to five minutes after starting the system, cooling effects may be felt in the car. Of course, all windows must be closed, permitting only

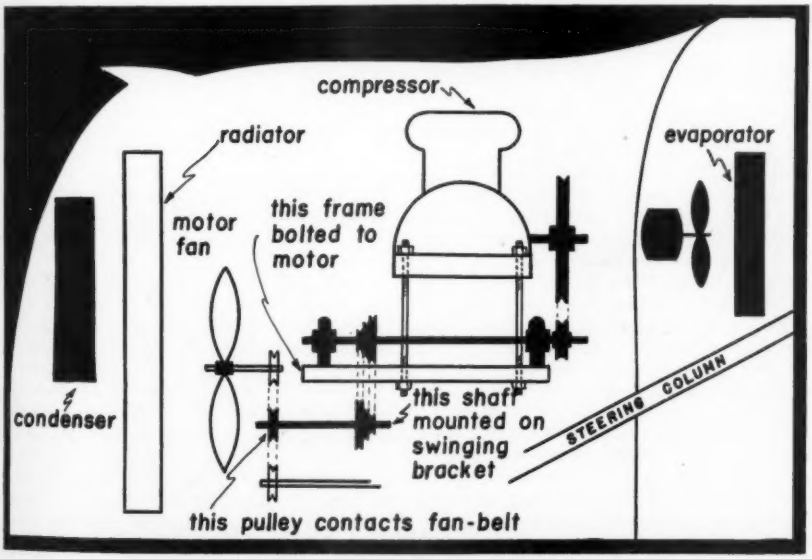


FIG. 1. SCHEMATIC DRAWING OF INSTALLATION.

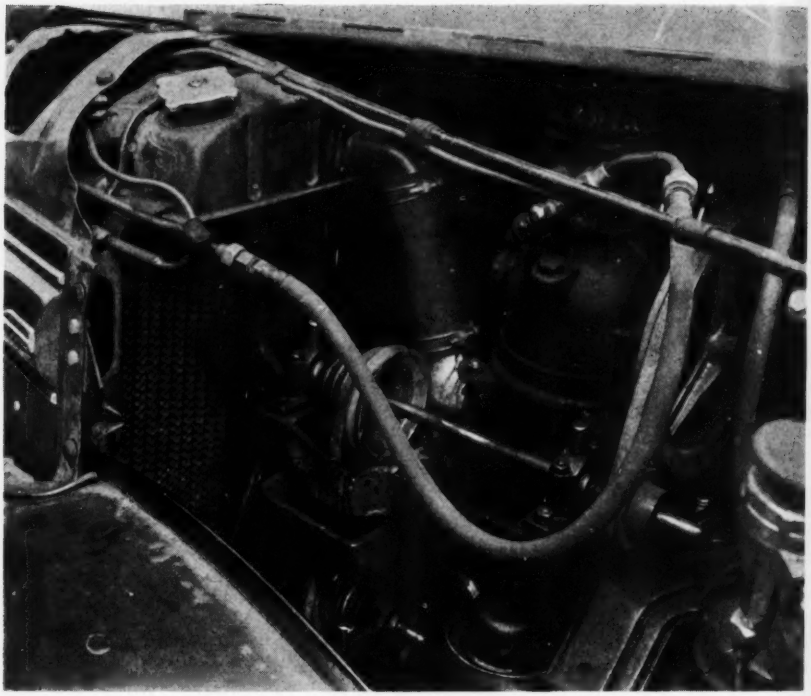


FIG. 2. PHOTO OF COMPLETED INSTALLATION.

sufficient opening for ventilation and the removal of tobacco smoke.

The greatest difficulty in this system is the proper regulation of the compressor speed to the changing motor speeds. In the sketch, Fig. 1, is shown the drive shaft arrangement in relation to the compressor, and the fan belt drive. Adjustment of speed ratios is obtained through the three V-pulleys on each of the countershafts. By utilizing the large pulley on the lower shaft, an estimated maximum compressor speed of 650 r.p.m. will be obtained, with a maximum car speed of thirty miles per hour.

Using the center pulley will give approximately 650 r.p.m. at the compressor at fifty miles per hour.

The small pulley permits a car speed of sixty-five miles per hour, with a compressor speed of 650 r.p.m.

Considerable guesswork is required in designing the system, or in determining the size required, since the space to be cooled is so small, and the heat input has such a wide variation due to rapidly changing outside conditions while traveling. The sun on all metal roofs is a large factor, of course, but the heat load due to changes in wind velocities at various car speeds represents a tremendous increase between city and country driving. Mr. Schroeder has not had sufficient time to gather any definite data on this as yet, but hopes to be able to do so soon.

Apparently the drive between motor and compressor is the most difficult part of this entire job. If a suitable flexible shaft drive, through an arrangement which would automatically compensate for the changing car speeds to maintain a definite compressor speed could be had, thus permitting the condensing unit to be placed in any available space around the car, a big part of the battle would be over. This drive arrangement, of course, would also have to be compact enough and cheap enough so that the total cost of the installation would not be prohibitive.

Fig. 2 is a photograph of Mr. Schroeder's installation. Considerable head room over the motor in this case permits the compressor to be mounted on top of it. Some cars would not have this advantage, and the compressor would have to be installed in some other available space in the car.

REFRIGERATION DEALERS, JOBBERS FIND EVILS OF INDUSTRY

AS a direct outgrowth of the increasing unfair practices encountered in the sale and repair of domestic and commercial refrigeration equipment, which is the primary cause of the unstabilized conditions in this industry, a group of men, representative of those affected, have in the past few weeks, started a move aimed at the correction of these evils.

While the move has received its initial start in Chicago, where conditions possibly are not of the exact nature encountered in other cities, it is expected, and other cities are invited to comment on, and join the move, so that it may be broadened in scope to meet the average conditions prevailing throughout the country.

The group of men, representative of the dealers, jobbers and service organizations in the city, have drawn up a set of resolutions, which in their estimation cover the major evils as existing today. It is the plan of the group that these resolutions be presented to the various interested organizations for their additions or corrctions, and finally, their endorsement.

Wide publicity will be given the matter so that organizations in other cities may become acquainted with it. All organizations or individuals interested are urged to send in their comments on or endorsement of, the resolutions. If addressed to this paper, immediate transfer will be made to the working committees.

The first of the two resolutions which follow is for presentation to the Parts Manufacturers and Jobbers' Associations; the second one is for presentation to the manufacturers of refrigeration equipment.

RESOLUTIONS FOR REFRIGERATOR PARTS MANUFACTURERS AND JOBBERS

WHEREAS, the jobbers, dealers and service shops have become an increasingly important factor in the refrigeration industry and represent the connecting link between the consumer and the manufacturer; and

WHEREAS, full cooperation is necessary between the parts manufacturers, jobbers, retailers, and service and installation shops in order to develop the industry and efficiently serve the public; and

WHEREAS, there have developed a number of conditions and practices in the industry which should be eliminated or corrected in order to bring about legitimate dealings and proper cooperation in the industry as a whole:

THEREFORE BE IT RESOLVED that the undersigned organizations representing the various factors in connection with the manufacture, sale, installation and service of domestic, commercial and air conditioning refrigeration equipment, hereby respectfully call upon the refrigeration equipment and parts manufacturers and jobbers to consider and endorse the following proposals:

(1) All parts and supplies catalogues, circulars, and descriptive literature issued by manufacturers and jobbers should contain only list prices with discount sheets to be issued from time to time.

(2) Dealers to pledge themselves in favor of dealing only with members of the National Refrigeration Supply Jobbers Association.

(3) The sale of parts, equipment and supplies by jobbers shall be restricted to authorized dealers and service shops which have established places of business.

(4) The sale of refrigeration gases by jobbers shall be restricted to quantities not less than factory packed drums.

(5) No premiums, rebates or inducements shall be offered, given or paid by anyone in the industry, nor shall there be improper or unreasonable discounts which would effect an unfair price reduction.

(6) Only uniform cash and quantity discounts shall prevail.

BE IT FURTHER RESOLVED that the undersigned organization submit these proposals to the parts manufacturers and jobbers and request them to appoint a committee to meet with a committee of the undersigned at this convention for the purpose of considering these resolutions and to make these said resolutions or modifications thereof effective immediately.

RESOLUTIONS FOR REFRIGERATOR MANUFACTURERS

WHEREAS, retailers of many lines of refrigerators in the principal distributive centers have, during the 1937 selling season, been confronted with widespread and vicious price-cutting by some unscrupulous dealers and have made it impossible for the legitimate retailers to secure an adequate or fair profit on the sale of their refrigerators and refrigeration and air conditioning equipment; and

WHEREAS, such price-cutting can be stopped and eliminated if the various refrigerator manufacturers, through their distributors and factory branches, cooperate in the enforcement of established prices and can greatly help the situation by invoking the Fair Trades Acts now in force in 42 of the states and given federal sanction by the recently enacted Miller-Tydings law; and

WHEREAS, there have developed other practices harmful to the sale and profit of the retail refrigeration dealer and installation and service man, such as (1) Direct sales by manufacturers to apartment buildings and real estate companies at prices lower than the dealers cost; (2) The so-called five and ten year warranties given by most manufacturers which are misleading to the public and thereby react unfavorably upon the dealer and service man alike; (3) The failure of manufacturers to furnish dealers and service shops with proper service data on equipment; (4) Insufficient discount allowances to recognized service shops on equipment and replacement parts.

THEREFORE BE IT RESOLVED by the undersigned organizations, that this resolution be submitted to the recognized refrigerator manufacturers and that the said manufacturers be requested to appoint a committee to meet with the committee of the undersigned during this convention for the purpose of seeking a satisfactory solution of the aforementioned evils; that negotiations be carried on between these committees for the purpose of a closer relationship and cooperation between the manufacturer and undersigned and the said negotiations shall continue until such time as the committee of the undersigned shall decide, but not beyond the first day of January, 1938, promptly after which time the committee shall report to the undersigned organizations and shall if they deem best publicize the findings in the various trade papers and publications.

Velocities in Suction Mains and Evaporators

Third Article and Tables for Freon

By J. O. SCHULTZ*

(The information herein contained was compiled by the author in 1933. Continued use since that time has borne out the accuracy of the data.—Editor.)

Dichlorodifluoromethane is a recent refrigerant which is increasing in use very rapidly. It is a dense vapor, being approximately one-fifth of the weight of carbon dioxide and six times the weight of anhydrous ammonia; although its operating pressures more nearly approach that of methyl chloride making it an ideal refrigerant.

This refrigerant does not attack any metals; therefore copper tubing, as well as steel, can be used for evaporators and mains.

In determining what would be the proper velocities for the vapors in the suction mains and evaporators, consideration was given to proportioning same to the velocities recommended for ammonia and carbon dioxide. This investigation shows conclusively that proportioning in direct ratio to the volume of a saturated vapor when using 5000 ft. per minute for ammonia at 5 degrees temperature is safe. The basis for the above statement is the fact that the accepted value of 5000 ft. per minute has been used for years, and if this proportioning is extended through to water the result will be 222 ft. per minute for the latter; 200 to 240-ft. velocity for water has also been used for years.

The accompanying table has been prepared on the aforementioned basis with a view that it is something to work on until test data can be accumulated.

The increase in condensed liquid temperature of 10 degrees reduces the coil carrying capacities at —20 degrees F., 2.7 per cent; at +5 degrees F., 2.1 per cent; and at 40 degrees F., 1.3 per cent. Velocities for F12 are shown in Table III.

*Chief Engineer, Rempe Co., Chicago.

TABLE III — Velocity in Suction Mains and Evaporators With Maximum Load Carrying Capacity of Coils

F12. Dichlorodifluoromethane—86° Condensing Temperature—Liquid Heat Content. 27.72

Suction Temp. °Fahr.	Vapor Volume Cu. Ft. per Lb.	Velocity in Suction Main. Ft. per Min.	Heat Content of Liquid at Evap. Temp.	B.t.u. to Cool Liq. to Evaporating Temp.	Latent Heat of Vaporization	Per Cent Vaporized to Cool Liquid	Velocity at Coil Outlet. Ft. per Min.	Heat Content of Vapor	Vapor Heat Less Liquid Heat	Lbs. of Refrigerant Circulated per Min. per Ton Refrig.	Displacement Cu. In. per Min. per Ton Refrigeration	Maximum Load Carrying Capacity of Single Continuous Coil											
												⅜ In. Tube 0.2419 Sq. In. Area		¾ In. Tube 0.34837 Sq. In. Area		1 In. Std. Pipe 0.864 Sq. In. Area		1¼ In. Std. Pipe 1.495 Sq. In. Area		2 In. Std. Pipe 3.355 Sq. In. Area	
												Tonnage	B.t.u. per Hour	Tonnage	B.t.u. per Hour	Tonnage	B.t.u. per Hour	Tonnage	B.t.u. per Hour	Tonnage	B.t.u. per Hour
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
20	2.474	2755	4.07	23.65	71.80	32.9	610	75.87	48.15	4.158	17750	0.0998	1198	0.1437	1734	0.3565	4278	0.6168	7402	1.3848	16610		
18	2.370	2697	4.48	23.24	71.63	32.4	595	76.11	48.39	4.133	16926	0.1020	1224	0.1469	1763	0.3643	4372	0.6304	7565	1.4147	16976		
16	2.271	2639	4.89	22.83	71.45	32.0	581	76.34	48.62	4.113	16141	0.1045	1254	0.1505	1806	0.3739	4478	0.6458	7750	1.4493	17399		
14	2.177	2583	5.30	22.42	71.27	31.5	566	76.57	48.85	4.094	15402	0.1067	1280	0.1536	1843	0.3811	4573	0.6594	7913	1.4799	17759		
12	2.088	2525	5.72	22.00	71.09	30.9	551	76.81	49.09	4.074	14690	0.1089	1307	0.1568	1882	0.3890	4668	0.6730	8076	1.5104	18125		
10	2.003	2478	6.14	21.58	70.91	30.4	539	77.05	49.33	4.054	14031	0.1115	1338	0.1606	1927	0.3982	4778	0.6891	8269	1.5464	18557		
8	1.918	2427	6.57	21.15	70.73	29.9	525	77.29	49.57	4.035	13401	0.1137	1364	0.1637	1964	0.4061	4873	0.7027	8438	1.5769	18923		
6	1.842	2378	6.99	20.73	70.53	29.4	513	77.52	49.80	4.016	12804	0.1163	1396	0.1675	2010	0.4154	4985	0.7188	8626	1.6130	19356		
4	1.778	2331	7.41	20.31	70.33	28.9	501	77.72	50.00	3.998	12314	0.1191	1429	0.1711	2053	0.4243	5092	0.7342	8810	1.6472	19772		
2	1.703	2286	7.83	19.89	70.15	28.4	489	77.90	50.26	3.979	11709	0.1218	1461	0.1745	2094	0.4339	5192	0.7490	8988	1.6797	20157		
0	1.637	2242	8.25	19.47	69.96	27.8	478	78.21	50.49	3.961	11304	0.1238	1486	0.1783	2140	0.4432	5306	0.7651	9181	1.7170	20604		
+																							
1	1.610	2222	8.46	19.26	69.87	27.6	473	78.33	50.61	3.952	10995	0.1249	1499	0.1799	2159	0.4461	5353	0.7719	9263	1.7383	20788		
2	1.574	2198	8.67	19.05	69.77	27.3	466	78.44	50.72	3.943	10724	0.1261	1513	0.1816	2179	0.4504	5405	0.7793	9352	1.7489	20987		
3	1.544	2177	8.89	18.83	69.67	27.0	461	78.56	50.84	3.934	10496	0.1275	1530	0.1836	2203	0.4554	5465	0.7880	9456	1.7683	21320		
4	1.514	2154	9.10	18.62	69.57	26.8	455	78.67	50.95	3.925	10268	0.1286	1543	0.1852	2222	0.4593	5512	0.7948	9538	1.7836	21403		
5	1.485	2135	9.32	18.40	69.47	26.5	450	78.79	51.07	3.916	10048	0.1300	1560	0.1872	2246	0.4643	5572	0.8034	9641	1.8030	21636		
6	1.457	2114	9.53	18.19	69.37	26.2	445	78.90	51.18	3.907	9836	0.1313	1576	0.1891	2269	0.4690	5628	0.8115	9738	1.8210	21852		
7	1.430	2095	9.75	17.97	69.27	25.9	440	79.02	51.30	3.899	9635	0.1326	1591	0.1909	2291	0.4736	5683	0.8195	9834	1.8391	22069		
8	1.403	2075	9.98	17.76	69.17	25.7	435	79.13	51.41	3.890	9431	0.1339	1607	0.1928	2313	0.4781	5740	0.8275	9930	1.8571	22285		
9	1.377	2054	10.16	17.56	69.07	25.4	430	79.25	51.54	3.881	9231	0.1353	1624	0.1948	2338	0.4818	5780	0.8353	10024	1.8750	22501		
10	1.351	2035	10.39	17.33	68.97	25.1	424	79.36	51.64	3.873	9041	0.1361	1633	0.1960	2352	0.4861	5833	0.8411	10093	1.8876	22651		

Continued on Next Page

TABLE III – CONT. – VELOCITY IN SUCTION MAINS AND EVAPORATORS WITH MAXIMUM LOAD CARRYING CAPACITY OF COILS

F12. Dichlorodifluoromethane—86° Condensing Temperature—Liquid Heat Content. 27.72

11	1.326	2018	10.61	17.11	68.87	24.8	420	79.48	51.76	3.865	8856	0.1377	1652	0.1983	2380	0.4918	5902	0.8510	10212	1.9098	22908
12	1.301	1998	10.82	16.90	68.77	24.6	415	79.59	51.87	3.856	8669	0.1390	1668	0.2002	2402	0.4965	5958	0.8591	10309	1.9278	23134
13	1.277	1979	11.04	16.68	68.67	24.3	410	79.71	51.99	3.847	8490	0.1402	1682	0.2019	2423	0.5008	6010	0.8665	10398	1.9445	23334
14	1.253	1960	11.26	16.46	68.56	24.0	405	79.82	52.10	3.839	8312	0.1414	1697	0.2036	2443	0.5050	6060	0.8739	10487	1.9611	23533
15	1.230	1942	11.48	16.24	68.46	23.7	400	79.94	52.22	3.830	8141	0.1426	1711	0.2053	2464	0.5093	6112	0.8813	10576	1.9778	23734
16	1.207	1925	11.70	16.02	68.35	23.4	396	80.05	52.33	3.822	7971	0.1442	1730	0.2076	2491	0.5150	6180	0.8912	10694	2.0000	24000
17	1.185	1907	11.91	15.81	68.25	23.2	392	80.16	52.44	3.814	7811	0.1457	1748	0.2098	2518	0.5204	6245	0.9005	10806	2.0208	24250
18	1.163	1888	12.12	15.60	68.15	22.9	387	80.27	52.55	3.806	7648	0.1469	1763	0.2115	2538	0.5247	6296	0.9079	10895	2.0374	24449
19	1.142	1872	12.34	15.38	68.05	22.6	383	80.38	52.66	3.798	7494	0.1484	1781	0.2137	2564	0.5300	6360	0.9171	11005	2.0582	24698
20	1.121	1855	12.55	15.17	67.94	22.3	378	80.49	52.77	3.790	7342	0.1494	1793	0.2151	2581	0.5336	6403	0.9233	11080	2.0721	24865
21	1.101	1837	12.78	14.94	67.83	22.0	374	80.60	52.88	3.782	7195	0.1509	1811	0.2173	2608	0.5390	6468	0.9326	11191	2.0929	25148
22	1.081	1821	13.00	14.72	67.72	21.7	369	80.72	53.00	3.774	7050	0.1519	1823	0.2187	2624	0.5425	6510	0.9388	11266	2.1067	25280
23	1.062	1806	13.22	14.50	67.62	21.4	365	80.83	53.11	3.766	6910	0.1533	1840	0.2208	2650	0.5475	6570	0.9474	11369	2.1262	25514
24	1.043	1788	13.44	14.28	67.51	21.2	361	80.95	53.23	3.757	6772	0.1547	1856	0.2228	2674	0.5525	6630	0.9561	11473	2.1456	25747
25	1.025	1772	13.66	14.06	67.40	20.9	357	81.08	53.36	3.748	6639	0.1561	1873	0.2248	2698	0.5575	6690	0.9647	11576	2.1650	25980
26	1.007	1757	13.88	13.84	67.29	20.6	353	81.17	53.45	3.742	6511	0.1574	1889	0.2267	2720	0.5622	6746	0.9728	11674	2.1830	26196
27	0.990	1743	14.10	13.62	67.18	20.3	349	81.28	53.56	3.734	6388	0.1586	1903	0.2284	2741	0.5665	6798	0.9802	11762	2.1997	26396
28	0.973	1727	14.32	13.40	67.07	20.0	345	81.39	53.67	3.726	6264	0.1599	1919	0.2303	2764	0.5711	6853	0.9883	11858	2.2177	26612
29	0.956	1713	14.54	13.18	66.96	19.7	342	81.50	53.78	3.719	6143	0.1616	1939	0.2327	2792	0.5772	6926	0.9987	11984	2.2413	26896
30	0.939	1697	14.76	12.96	66.85	19.4	338	81.61	53.89	3.711	6022	0.1629	1955	0.2346	2815	0.5818	6982	1.0068	12082	2.2593	27112
31	0.923	1683	14.99	12.73	66.74	19.1	334	81.72	54.00	3.704	5918	0.1638	1966	0.2359	2831	0.5850	7020	1.0123	12148	2.2718	27262
32	0.908	1669	15.21	12.51	66.62	18.8	330	81.83	54.11	3.696	5799	0.1652	1982	0.2379	2855	0.5900	7080	1.0210	12252	2.2912	27494
33	0.892	1655	15.43	12.29	66.51	18.5	327	81.94	54.22	3.689	5687	0.1669	2003	0.2403	2884	0.5961	7153	1.0315	12378	2.3148	27778
34	0.877	1639	15.65	12.07	66.40	18.2	323	82.05	54.33	3.681	5578	0.1681	2017	0.2421	2905	0.6004	7205	1.0389	12467	2.3314	27977
35	0.862	1625	15.88	11.84	66.29	17.9	319	82.16	54.44	3.674	5473	0.1692	2030	0.2436	2923	0.6043	7252	1.0457	12548	2.3467	28160
36	0.848	1613	16.10	11.62	66.17	17.6	316	82.27	54.55	3.666	5372	0.1708	2050	0.2460	2952	0.6100	7320	1.0556	12667	2.3689	28427
37	0.833	1599	16.33	11.39	66.06	17.2	312	82.38	54.66	3.659	5267	0.1720	2064	0.2477	2972	0.6143	7372	1.0630	12756	2.3855	28626
38	0.819	1585	16.55	11.17	65.94	16.9	309	82.49	54.77	3.652	5168	0.1736	2083	0.2500	3000	0.6200	7440	1.0739	12875	2.4077	28892
39	0.805	1571	16.78	10.94	65.83	16.6	305	82.60	54.88	3.644	5068	0.1747	2096	0.2516	3019	0.6240	7488	1.0797	12956	2.4230	29076
40	0.792	1559	17.00	10.72	65.71	16.3	302	82.71	54.99	3.637	4978	0.1761	2113	0.2536	3043	0.6290	7548	1.0883	13060	2.4424	29309
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

○ ○ ○ ○ ○

Sweat Fittings

How to Make a Perfect Joint

THE sweat fitting, according to information published by the Imperial Brass Co. assures an absolutely tight connection for electric refrigeration, gas, oil, air and vacuum lines, a connection actually stronger than the tube itself. It is vastly lighter, simpler, more quickly fitted than the conventional types of fittings, representing a remarkable saving of time and labor, as well as giving absolute assurance that every connection is both perfect and permanent. No flaring is necessary, and there is no waste "endage." The fitting itself is lighter, meaning a considerable saving in weight. The inside diameter of the fitting is the same as that of the tubing. There are no uneven surfaces or obstructions. Material and installation costs are cut approximately in half.

Sweat fittings, with the exception of the coupling, are made of forged brass. Forgings being made in dies, under tremendous pressure, have a dense close-grained structure that makes seepage impossible. The coupling is made from drawn seamless tubing.

When the fitting and copper tube have been cleaned, fluxed, assembled and heated to the proper temperature, solder is fed into it through the feed hole. It does not make the slightest difference where the feed hole is located on the job — whether top, bottom, or side. It may be fed from any position and will flow upwards just as readily as downwards. There is no guess work about it—capillarity inevitably works, sure and certain as gravitation itself. The feed hole, which is located midway between the internal shoulder and the outer edge of the fitting, is an important and exclusive feature.

The bonding of tube to fitting is not mechanically produced by feeding from the end of the fitting—it occurs inevitably and automatically as a result of the phenomenon of capillary attraction. The solder is fed through the feed hole into the feed channel in the fitting from whence it is distributed by capillarity evenly and thoroughly between the bonding surfaces and flows outwards to the end of the fitting, where it appears as a continuous solder ring around

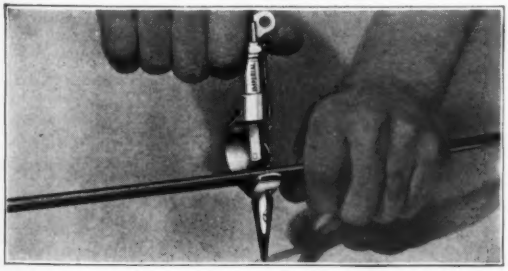


FIG. 1. CUT TUBE TO LENGTH WITH TUBING CUTTER, THEN REAM.

FIG. 2. CLEAN OUTSIDE OF TUBE WITH SAND CLOTH OR PAPER.

FIG. 3. THOROUGHLY CLEAN INSIDE OF FITTING WHERE PIPE IS TO BE INSERTED. LEAVE NO DARK SPOTS.

the entire circumference of the tube. This is the proof of a perfectly bonded joint. It is visual assurance that it is gas tight, that vibration cannot work it loose, that it is permanent and actually stronger than the tube itself. This is a feature that no other fitting possesses.

Strength of Patented Joint

Photomicrographs and innumerable tests have conclusively proved that a joint made with copper tube and fittings is actually a perfect bond of tube, solder and fitting. This patented joint is of such amazing strength that if two ¾" sections of tube are connected with a ¾" coupling and pulled in the Olsen testing machine, it requires the enormous pull of approximately nine thousand pounds to fracture the tube, while the joint remains invariably intact without the slightest sign of damage of any kind.

How the Joint Is Made

1. Cut pipe square with Tube Cutter, being careful not to indent tubing. Use reamer to remove all burrs.

2. Using sandcloth, sandpaper, or steel wool, thoroughly clean outside end of copper pipe equal to depth of fitting. Leave no dark spots.

3. Using sandcloth, sandpaper, or steel wool, thoroughly clean inside of fitting where pipe is to be inserted. Use scraper, if necessary for cleaning groove or feed hole.

4. Apply a coat of soldering flux to outside of pipe and inside of fitting. Be sure that the flux is distributed evenly. Make certain that there is plenty of flux in the feed hole also. In extremely cold weather warm fitting slightly with torch to approximate room temperature (70 to 80 degrees).

5. Slip pipe into fitting until it will go no further and turn back and forth once or twice to further insure an equal distribution of the flux.

6. Use only special solders as they are especially prepared for this work.

7. Using a blow torch or gas tip, melt a drop of solder into the solder feed hole. Apply heat around fitting until drop of solder disappears, which indicates that the proper temperature has been reached. Where feed hole is located at side or bottom, the proper temperature may be ascertained by touching the heated fitting with the end of the solder wire (preferably in the feed hole)—when solder melts upon contact, the proper temperature for soldering has been reached. Feed solder through feed hole only until it appears around the end of the fitting for the full pipe circumference. Now remove the flame and a second or two later, as the connection starts to cool, completely fill feed hole with solder and remove surplus with a small piece of cloth.

FIG. 4. USING A BRUSH APPLY COAT OF FLUX TO INSIDE OF FITTING.

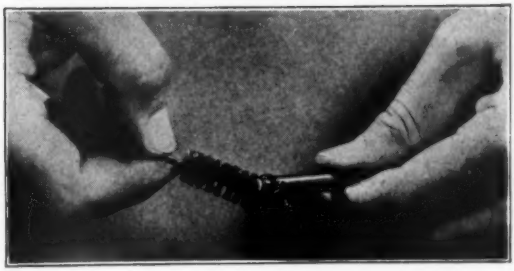


FIG. 5. APPLY COAT OF FLUX TO OUTSIDE OF TUBE.

Bonding the surfaces and filling the hole should be done completely in one heating operation. A little experience soon enables the operator to make perfect solder joints.

8. It is advisable on sizes larger than 1¼" to move the fitting on the pipe or tap with hammer when the solder starts in, thus breaking the surface tension and insuring equal distribution.

Tools Needed

Torch; Tubing Cutter; Special Solders and Solder Flux; Medium or No. 1 Sandcloth, Sandpaper or Steel Wool.

Precautions

A. DO NOT cut tube at an angle. Use Tubing Cutter. This will give you a right angle cut quickly and easily.

B. DO NOT try to solder dirty joints. Clean thoroughly with sandcloth, sandpaper or steel wool.

C. DO NOT use other than special flux and solder in refrigerated compartments.

D. DO NOT use a soldering iron. Use an acetylene tip or blow torch.

E. DO NOT try to feed solder from the end of the fitting.

F. DO NOT solder when the joint is too hot or too cold. Follow soldering operations as described under Rule 7.

G. DO NOT try to hurry the solder. It flows freely when at the proper temperature, but burns when too hot.

H. DO NOT leave a job with the feed holes not properly filled. Always fill the feed holes with solder.

IMPORTANT!

Experience has shown that the atmosphere in refrigerated compartments used for the storage of foods or cut flowers contains a considerable amount of carbon dioxide given off by the food or flowers.

Carbon dioxide in combination with moisture creates a chemical compound which has a harmful reaction on lead or lead-tin solder.

This condition has been found to exist only inside a storage compartment. However, a lead free solder suitable for all general refrigeration purposes should be used. This solder, commonly known as 95-5, is composed of tin and antimony. It is recommended that lead free solder be used with solder fittings on all commercial refrigeration installations.

S S S

Paul A. Kerz
Iowa

Your monthly journal has been an interesting and helpful manual to me for a long time; in fact, I have saved every issue since the first publication came out.

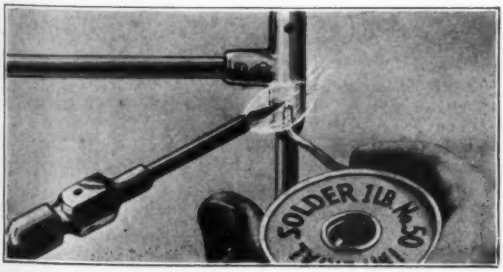


FIG. 6. APPLYING SOLDER TO THE JOINT.

The Question Box

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment as well as oil burners to "The Question Box."

REPLACING AMMONIA SYSTEM WITH FREON IN MILK PASTEURIZER

QUESTION 225. **Being a subscriber to your service, we are taking the liberty of writing to your place for information on the proper equipment and installation of coils and cooling capacity in a brine tank. The brine tank measures 6 feet long, 20 inches high and 3 feet wide. It is now equipped with ammonia pipes and a calcium chloride brine. The condensing unit used is a 2-hp. ammonia type.**

At the present time, there is about 3 inches of brine in the bottom of the tank. This brine is being circulated through a 5 foot aerator milk cooling coil. Its load is the cooling of 600 quarts of pasteurized milk daily, plus a 2 foot aerator whose load is 50 quarts of pasteurized cream daily. In addition to the milk cooling load, the brine tank is located in a walk-in cooler whose inside dimensions are 8 feet 6 inches long and 6 feet wide and 8 feet 6 inches high. The cooler is insulated with 4 inches of cork and has one service door and no windows. The cooler is used for storing bottled and canned milk.

We would like to install new coils in the brine tank and a forced-draft cooling unit. Do you think it advisable to use Freon refrigerant to replace the ammonia system, and if so, what size copper pipe and how many lengths would you advise using in this brine tank; also, state the gauge of copper and type of connecting bends and over-all construction of coil, considering that the tank is to be used only for circulating brine purposes? Also, give the amount of brine necessary for this tank and what brine solution would be best. Please state size of Freon condensing unit necessary to handle the load. We are dealers in Kelvinator commercial equipment.

ANSWER: In cooling 600 quarts of milk and 50 quarts of cream it will be necessary to remove slightly less than 40,000 B.t.u. if we use the cold brine to reduce the temperature of the milk and cream about 30 degrees assuming that from your warm milk part of your pasteurizing system the milk is partly cooled by water to a temperature of approximately 65 degrees to 70 degrees.

The brine tank which you now have should be of sufficient size for the job and, if you desire to replace the old ammonia coil with a copper coil, I would suggest that you use a similar copper tube coil as in using a calcium chloride brine the calcium has a decidedly detrimental effect on the ordinary lead and tin solder.

I am not exactly sure as to what effect calcium chloride brine has on a tin and antimony solder such as is ordinarily used in hard wall tubing work. If you find that the brine has no detrimental effect on the tin-antimony solder, hard wall tubing might be used using a return bend at each end and, if you are going to use a one or one and one-half horsepower cooling unit and the tank is well insulated, 100 feet of five-eighths tubing should be sufficient. If you are going to use a two-horsepower machine, it might be advisable to use two coils of about 75 feet each with separate thermostatic expansion valves. This would be especially advisable if Freon is to be used as the refrigerant as Freon seems to be more seriously affected by drops in pressure through the tubes than are the other refrigerants. If you could use a methyl chloride machine, you would have less difficulty with pressure drop through the coil. If you are to use one continuous coil of 100 feet of tubing for a Freon system, you should use about seven-eighths inch outside diameter coil in order to avoid excessive drop in pressure.

STARTING THE SPARTON AFTER LONG SHUT DOWN

QUESTION 226. **I have a Sparton refrigerator that was made in 1935. It has not been operating since last September; we will say nine months since it was last in operation.**

The machine was not pumped down when shut off. In another month, they want it started. I presume this machine contains sulphur dioxide in the condensing unit and evaporator, also. The question is:

Is it safe to start this machine when out of service for several months without being pumped down when it was shut off? What will happen when it does start with refrigerant all through the system (if there is in this one)? Will it run properly or not?

ANSWER: Theoretically, the refrigerator should start up and operate all right as soon as it is plugged in. Actually, we find that when the machine is shut down for a considerable period of time, corrosion may result and the oil may be decomposed to some extent so that a number of parts in the system may not work properly.

It may be that the valves will not seal properly when the machine first starts. It may be that the expansion valve will stick open or closed; and it may be that the seal will not hold when the machine is put into operation. There are any number of things which may occur and the only thing that can be done is to start the machine and see what actually does happen. It may be that the machine will operate perfectly all right, or it may be that any one of the things mentioned may have happened.

The machine uses sulphur dioxide as refrigerant and an automatic expansion valve as a pressure reducing device. It is possible that the machine may slug oil and refrigerant in starting in case the liquid refrigerant is present in the crankcase. My advice would be to simply start it up and give it a chance and then see what develops.

SERVICING AMMONIA MACHINES

QUESTION 227. I am getting so many calls on ammonia machines and being unaccustomed to servicing them, I would like to ask a few questions:

(1) Kindly insert an operating chart for ammonia machines.
(2) If air gets in the machine, what effect will it have?
(3) What is the best way to test for a leak?
(4) On a showcase or refrigerated window and meat box, would one expansion valve operate this job properly?
(5) Is an ammonia compressor built to pull 30 inches of vacuum? If not, what is its greatest pull?

ANSWER: Answering your questions in the order named: The temperature-pressure relations for ammonia are as indicated below:

Temp. in degrees. F.	Press. in lbs. Gauge	Temp. in degrees F.	Press in lbs. Gauge
—10	9	60	93
0	16	70	114
10	24	80	138
20	34	90	166
30	45	100	197
40	59	110	232
50	75	120	272

If air gets in the system, its effect will be to raise the head pressure. The head pressure may also be raised slowly by the formation of non-condensable gases in the ammonia system which may occasionally have to be purged out in order to bring the head pressure back to normal.

You may test for leaks by using litmus paper moistened with water. The change in color of the litmus paper indicates the presence of ammonia.

You may also test by means of sulphur tapers which on being ignited produce a small amount of sulphur dioxide which when held under a leak will show a white smoke as the sulphur dioxide and ammonia combine. A small amount of sulphur dioxide introduced into the air by any other means will also give a good indication of ammonia leaks.

A good many ammonia systems use only one expansion valve and the exposed refrigerant lines from one refrigerator to another are insulated with a good insulating material. The suction line back to the compressor may be insulated also.

In some cases the machine is stopped and started by means of a temperature control in one of the refrigerators and if the expansion valve is adjusted exactly right for the combination of coolers fairly satisfactory operation may be obtained.

Some experimentation with the expansion valve setting may be required in order to obtain the proper temperature in both coolers.

An ammonia compressor should draw very nearly the same vacuum as other refrigerator compressors. I would say that if the compressor would draw from 20 to 26 inches of vacuum against atmospheric discharge pressure with the suction side closed off that indications are that the compressor will work properly.

ALCOHOL IN SYSTEM FOR MOISTURE

Question 228. In the July issue of this year, I notice in your answer to your client's question No. 209 you state that methyl alcohol should not be used in a methyl chloride system as a means of eliminating moisture trouble.

I do not mean to say that I have been successful in using alcohol for this purpose, but have in several instances done so, and have not noticed any ill effect, though there may have been, but not to the extent in the way of corrosion at expansion valves that was noticeable.

Now the question is this: Will all expansion valves be affected, or is it that only some of them, for I have under service at the present a commercial job consisting of a walk-in cooler and a double-duty case with a 1-hp. air-cooled compressor that started giving trouble of short-cycling, and after so long a time, would then run on normal cycle, though the temperature in both cooler and case was not as it should be. Assuming that the trouble must be either oil condition or moisture, I first used 10 c.c. of anhydrous methyl alcohol and there was no change in the operation, so I then proceeded to remedy the oil trouble by my usual method, which had been successful in another case, of changing the oil in the compressor, knowing that some of the old or among the first used, did not have the best oil in them when leaving the factory. This did remedy the short-cycling, and all was well in every respect, with the exception of the operation of the top coil of the double-duty case, which did not seem to use all of the coil as it should during the running time of the compressor, but it was not so very long until I noticed that the expansion valve was not so easy to adjust in an attempt to get more coil in action, though the bulb would respond to hand temperature and cause a frost out on suction line, and as now my trouble is failure to get top coil to function properly to produce the desired temperatures, when all other coils are working good and readily respond to valve adjustments. This valve I am having trouble with is a Peerless automatic, and the others are Fedders and American Injector. The compressor is a Servel; the coils are possibly Larkin.

Will it be necessary to remove the methyl alcohol from the system in order not to corrode a new valve when installed in place of the Peerless, or merely change the valve in order to get more satisfactory operation? Please write me on this as soon as possible.

Answer: It is quite possible that the trouble you are having may be due in part to the alcohol in the system. My suggestion would be that you pump all the refrigerant in the system into a drum and draw a high vacuum on the whole system for possibly half an hour or more and it may be a good idea to allow some air to enter the system washing through the condenser, receiver, liquid line, evaporators and compressor and out into the atmosphere. Then I would suggest putting a good calcium oxide drier in the liquid line as a permanent drier. I would then charge the refrigerant back into the system through the suction side evaporating the refrigerant in the refrigerant drum using hot water or heat under the drum if necessary in order to make it go in fast enough. The idea is to distill the refrigerant or to take the vapor off and when there is only a pound or two of refrigerant left in the refrigerant drum I would throw this refrigerant out entirely replacing it with new refrigerant. Thereby I believe you will remove most of the harmful part of the refrigerant and alcohol.

With the drier in the system and with the expansion valve set for the proper superheat, there should be no difficulties either with short cycling or any other kind, provided that the screens in the expansion valves were also properly opened. You may get fairly satisfactory operation simply by replacing the faulty valve and installing a calcium oxide drier in the liquid line, but the more thorough method should be preferable.

TROUBLE WITH MILK COOLER

Question 229. I have a dairy using an aerator to cool milk, and we are using the bottom section of aerator with refrigeration for the final cooling, and cannot cool milk colder than 50 degrees. We are using water to cool the top two sections, and cool milk to about 65 degrees before it comes to last section which is refrigerated.

The aerator is 6 ft. long and has twelve ¾ inch tubes in each section.

The thermostatic expansion valve is hooked up for counter-flow in aerator, and is an 8-ton A & P valve. Could you recommend what setting this valve should have and what could be the difficulty in this equipment?

The machine has plenty of gas and is a 3-hp. Servel, hooked direct to aerator. Compressor is about 22 ft. from aerator and has a ⅝ inch suction line and ¼ inch liquid line.

ANSWER: In your question you do not state how much milk is being cooled or at what rate the milk is being cooled. I would estimate that the three-horsepower machine hooked to the aerator, for one thing, should have at least two five-eighths inch suction lines. The one-quarter inch liquid line should be all right for methyl chloride.

With the proper size suction line I estimate the machine will deliver two tons of refrigeration which should be sufficient to cool slightly over three gallons of milk per minute from 65 degrees to 50 degrees. In order to cool the milk from 65 degrees to 40 degrees approximately 25 B.t.u. will have to be removed from each pound of milk and with two tons refrigerating capacity, which is 400 B.t.u. per minute, this would be sufficient to cool in the neighborhood of 16 pounds of milk per minute through the 25 degrees temperature change.

If you are running the milk through the aerator at a rate of not over two gallons per minute, the machine has sufficient capacity to cool the milk 25 degrees. If the milk is to be run over the aerator for considerable periods of time, it must either be run over quite slowly or else the size of refrigerating machine must be increased. If the milk is to be aerated in one hour or less, I would suggest it would be advisable to use the refrigerating machine to cool brine for a few hours to a temperature of approximately 10 degrees to 20 degrees and then circulate the cold brine through the aerator when the milk is being cooled. I believe that if the thermostatic expansion valve has the original setting on the valve that it should work satisfactorily, or it should be set for from 6 degrees to 12 degrees superheat.

Servel Evaporative Condensers

By P. B. REED*

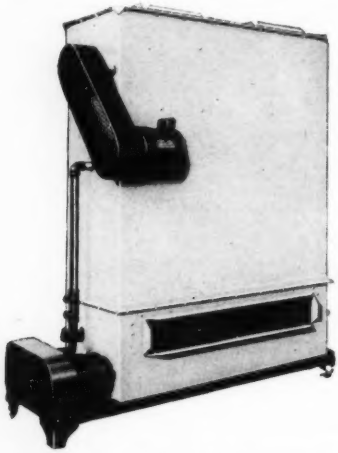
THE evaporative condenser may be likened to the chilling unit of a refrigerating system in that it removes heat by taking advantage of the latent heat of vaporization of a liquid. In the chilling unit the replacement in liquid form is caused to boil and thus absorb heat equivalent to the latent heat of vaporization of the refrigerant. The vapor thus produced is not allowed to be lost but is brought back to the machine unit, compressed, condensed into a liquid and used over again. In the case of the evaporative condenser the refrigerant employed is water and no attempt is made to save it after it is vaporized. Instead of the water boiling it is simply spread out over a large surface and placed in contact with a large amount of comparatively dry air into which the water is readily evaporated.

Vaporizing one pound of water requires 970 B.t.u.'s of heat. Since only one B.t.u. is required to heat one pound of water one degree F. it follows that even though a temperature rise of 25 degrees of the water is permitted it would require for the ordinary water-cooled condenser 38.9 pounds of water to remove the same amount of heat (960 B.t.u.) that could be removed by the evaporation of but one pound of water. With a temperature rise of 20 degrees the ratio becomes 48 to 1, and with a 15 degrees' rise the ratio is 65 to 1. It is apparent that remarkable savings in condensing water usage can be obtained by the use of the evaporative condenser, particularly in those localities having comparatively high water rates, combined with warm supply water and especially if the average summer relative humidity is low.

The temperature of the supply water to the evaporative condenser makes but little difference either in the amount of the water consumption or in fact in the condensing temperature, since the latter depends on how rapidly the water evaporates into the air and this in turn is determined by the wet bulb temperature of the air. Under normal conditions the condensing temperature can, with a well designed evaporative condenser, be kept within 25 degrees to 30 degrees of

*Service Manager, Servel, Inc.

the wet bulb temperature of the air, with a water usage of only about 5 percent to 10 percent of the amount that would be used by an ordinary water-cooled condenser. The amount saved is not all pure savings, however, as the cost of electricity for the pump motor and fan motor must be deducted. Nevertheless the net savings are quite considerable and will in many localities pay for the evaporative condenser in two or three years.



SERVEL EVAPORATIVE CONDENSER

In some cities, particularly in the congested business districts, the increased demands have outgrown the water mains and sewers, and local restrictions are placed upon the amount of water that may be taken from the mains or wasted into the sewers. In such localities some form of atmospheric condenser is a necessity.

In its simplest form an evaporative condenser would consist of a condenser coil through which the hot refrigerant gas from the compressor passes, and over this coil would be continuously sprayed a drenching of water. To accelerate the evaporation of the water a motor-driven fan is added to blow a current of air over the wet coil. The coil is enclosed in a housing to get the full benefit of the fan. The outlet air, moisture laden, is conducted outside the building by a duct from the enclosing housing. The inlet air may in some instances be led from outside the building to the evaporative condenser or simply drawn from the basement or other room in which the evaporative condenser is located.

In the simple form above described only as much water is sprayed on the coil as can be evaporated. Silt, mineral matter and other impurities in the water are thus rapidly deposited on the coil, acting as an insulation, causing the head pressure to rise and making frequent cleaning of the coil necessary. This is a common fault of some designs of evaporative condensers.

In the better designs of evaporative condensers the coil is kept liberally flooded from several spray nozzles above the coil. Impurities in the water are thus washed from the coil making cleaning of the coil rarely necessary. From the coil the water falls into a sump from which by means of a motor-driven pump it is recirculated over the coil. Eliminator plates or baffles are placed above or beyond the spray nozzles so as to remove moisture that is entrapped in the air as it goes through the coil and sprays. Make-up water to the sump is fed through a float-operated valve that maintains constant sump water level. Approximately five gallons of water per hour are evaporated for each ton per 24 hour capacity of the machine unit.

Fixed Wastage

To prevent the sump water from fouling with silt and impurities in the water a fixed wastage of water is necessary. This may be obtained by setting the sump float valve high and allowing wastage into the sump overflow (in which case a solenoid valve is put in the water supply line and wired in parallel with the sump motor) or more simply by branching a line from the pressure side of the pump to the sewer and regulating the wastage by means of a hand valve. The amount of fixed wastage required to keep the sump clean will vary according to the cleanliness of the supply water, the average being 2½ gallons per hour per ton per 24 hour capacity of the installation.

If the compressor head is water-cooled the pump outlet to the spray nozzles may be run through the compressor head first, or a partial restriction may be placed in the pump outlet line and the compressor head piped around this restriction.

It is usually practical, when the evaporative condenser is installed in the basement, to draw the supply air to the evaporative condenser directly from the basement air.

In case of very dirty basements duct the inlet air from some other source. The outlet air must, however, be ducted to the outside, otherwise heat and moisture from the evaporative condenser would soon render its operation ineffective. Consult manufacturer's data to determine the size of the outlet duct. If the duct is too small, excess static pressure will be built up in the duct and the condensing temperature will be excessive due to reduction in the amount of air handled.

Manufacturer's tables should also be consulted when determining the size of evaporative condenser to be used. A size of evaporative condenser that, for the amount of heat it must extract will operate at a condensing temperature of 25 degrees to 30 degrees F. above the summer average wet bulb temperature, will usually be the size most economical to select considering both initial and operating cost.

Obvlously the evaporative condenser must be in full operation when the compressor is running; therefore, the motor driving the compressor must be wired in parallel with the pump and fan motors on the evaporative condenser, or the control system so wired that this is accomplished. Overload protection should, of course, be given all motors.

Servicing the McClellan Refrigeration Unit

Second Article—Continued from September

History, Description, Data and Service of One of the First Popular Ammonia Units. Many of These Units Are Still Operating and Are in Need of Service or Overhauling

By L. K. WRIGHT, M. E.

Ammonia Piping

WITH the evaporator coils in position, the liquid line, of extra heavy steel tubing, was run from the shut-off valve (or king valve,6) on the receiver (R) to the expansion valve, located near the coils. Shut-off valves were generally installed on either side of the expansion valve, so that it could be easily removed for servicing in the event of faulty operation. In many cases, such as where a butcher also had a counter to be refrigerated, a by-pass arrangement was employed, so that by opening one valve the expansion valve would feed both counter and refrigerator, as for summer operation and by closing that valve and opening another, only the refrigerator would be cooled. Only one expansion valve was used and all boxes or counters were connected in series. The counter would then be cut out of service, such as desired by many butchers for winter operation.

The liquid line in all cases, with the exception of the four-ton unit, was of steel tubing of ¼ inch iron pipe size. Wherever possible this tubing was bent in place of using elbows. No couplings were employed to join lengths of the tubing together; instead, flanges of the two bolt ammonia type were employed. It is a known fact that couplings give trouble and for that reason were rarely employed by this organization. Lead gaskets were used between the drop forged tongue and groove ammonia flanges.

Expansion Valve

The expansion valve employed was a rather large one, built of steel and iron castings, with a steel diaphragm. The expansion valve was located either in the refrigerator, over one of the decks, so that the drip would be caught, or else located outside the box, usually on level with the coils. In either case the valve was located at a height that it was necessary to use a step ladder to reach it if it needed any adjustments.

A few installations were made with the valve below the box, in the basement.

The expansion valve was preferably located on or near the level of the coils so that there would be no liquid head to impose additional pressure on the diaphragm. In some cases the expansion valve would be located in the basement, especially where

a by-pass hook-up was installed, and in such cases were found to operate satisfactorily.

Where the expansion valve was located externally it was necessary to run a galvanized sleeve through the box wall, with the ammonia pipe through it. This would prevent the drip from the cold ammonia line from water logging the refrigerator insulation. This ammonia feed line would be sealed in the wall with odorless pitch to prevent air infiltration at this point.

McClellan expansion valves rarely gave trouble, for the system was provided with large sized screens both in liquid and suction lines which removed all particles of dirt and scale from the system.

Suction Line

Suction lines were of extra heavy black steel pipe. Where more than one coil was used in a refrigerator and where the expansion valve was located externally it was customary to have all such connecting piping of galvanized stock, but all other piping of black stock. The suction line connected the end of the expansion coil with the suction port of the compressor, connection being made with a flange to the scale trap (13), as shown in illustrations 5, 6, and 7 in the September issue.

In bringing the suction line through a refrigerator wall a water-tight sleeve was first installed and packed with insulation to prevent condensation from getting into the insulation in the wall. Where lines were carried through the floor an opening large enough to permit the cork insulation to be applied was cut. After the insulation was in place two wooden half sections were applied to cover any unevenness and to seal the pipe and its covering in the floor hole.

Reference to Figs. 5, 6 and 7 will also serve to bring the fact that a tee was installed in the suction line near the unit to provide a connection for the suction gauge valve (19) so that the back pressure could be determined on gauge (20). This (19) was an all steel valve, provided with a ¼ inch standard female pipe thread opening to accommodate the low pressure ammonia gauge.

Piping and Hangers

All suction piping should be installed with sufficient clearance to allow the installation of proper cork covering after testing and should be securely supported by means of hangers from the ceiling or floor beams to avoid unnecessary strain on joints, fittings and valves. Piping can be temporarily hung with wire and after the cork jacketing is in place permanent hangers of perforated strap iron can be used to secure the lines. Use hangers only around the jacketing, as any metal hanger which contacts the piping will sweat or frost and will result in rusting the metal as well as water logging the insulation.

Pipe Threads

All threads in ammonia piping should be made up with a mixture of litharge and glycerine. White lead should never be used on ammonia lines, but should be employed on the water piping. It is preferable that lead gaskets be used in the ammonia flanges. Rubber gaskets are soft and flow easily under pressure. Rubber finds use where the groove has been very accurately machined so that the material will be retained, but for the smaller sizes of flanges employed in units such as the McClellan it has been found best to employ only lead gaskets.

In the event of an emergency, however, rubber may be substituted for a lead gasket but should be removed at the earliest opportunity. Flanges should be pulled together evenly by use of the bolts. If pulled together unevenly the bolts may be stripped and a leaky joint will result because the gasket is compressed unevenly.

Ammonia Fittings

Use drop forged steel fittings and under no circumstance employ those of cast-iron, even if of the extra heavy type. Cast iron or malleable iron fittings are considerably cheaper than the drop forged type, but when one considers the time element involved in removing leaky fittings and reinstalling new ones it will be found cheaper in the end to employ the more expensive drop forged fittings. In many cases the cast fittings will not show leaks until they have been in service for some time. Ammonia is a very excellent detergent and will lift dirt and sand out of a porous spot in the casting, so that after several months of use the casting may begin to leak and require replacement. Fittings in the suction line, or those between two refrigerators, will have to be stripped of the cork covering and new covering applied when the fitting has been replaced with a new one. This in itself is an expensive proposition.

Safety Valves

Due to the local code (Chicago) Mc-

Clellan apparatus was equipped with a safety valve. Some of the earlier models were not provided with safety valves, nor were those units shipped out of the state of Illinois provided with any safety or release valves.

The safety valve used was of the pop type and had a small discharge opening; that is, one about ¼ inch in diameter. This valve was acceptable in certain localities, but did not meet the safety codes of some cities, such as New York. Units located within the confines of New York City are required to have three safety valves; one on the receiver, one in the suction line and one in the discharge line before the discharge shut-off valve. This latter safety valve is some times teed into the suction line. The other two safety valves have the discharge openings carried to a vessel containing water or are piped to a diffuser located on the roof. The arrangement of piping, size of valve inlets and outlets, setting of valves, quantity of water in safety tank, etc., are usually specified in the local ordinances and should be referred to before any attempt is made to purchase or lay out the safety system.

Where the single safety valve manufactured by McClellan was acceptable to the local authorities the safety relief piping was connected from the outlet of the safety valve (41) and extended to a point outside the building above the roof. The outside end was provided with an inverted goose neck or a return elbow to prevent rain from entering. This exhaust end should never be located under a window or within ten feet of a window or door opening.

Safety Valve Piping

Standard ½ inch galvanized water pipe was used for safety valve piping for Illinois installations, while one inch lines were used in New York. The safety blow-off line should be run with as few elbows as possible. Where the run to the roof or outer air would be excessive the safety line was run into a galvanized iron drum of about 50 gallons capacity. The drum was provided with a portion of the head or cover hinged so that the water could be kept to the proper level. The safety relief piping was run into the solid part of the head and extended to within two inches of the bottom. The serviceman would occasionally test the water in the relief drum to make sure that the safety valve was holding tightly. If the test revealed the presence of ammonia it was usual to first inspect the safety valve on the receiver.

The safety piping should be strapped or secured in place to prevent vibration and strain on the valve or valves.

Care of Leather Belts

The motors on all machines were slidably arranged for belt adjustment. Belts should not be operated in too tight a condition, nor should they be run loose. A belt should

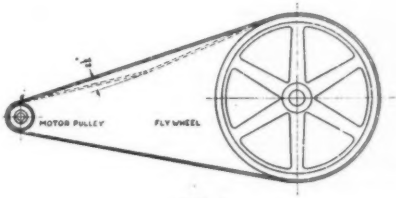


FIG. 8

be so adjusted that the spanning section from motor to flywheel can be depressed with strong thumb pressure approximately 2½ inches, as indicated in Fig. 8.

Rosin or belt compounds were not approved. Rosin or improper belt dressings would result in bumps being formed on the belt. It was found that a clean belt, with proper tension, would operate with perfect satisfaction, whereas no amount of belt dressing would improve the operation or life of a belt operated with improper tension.

When rosin or belt dressing was applied the noise of belt operation was sometimes objectionable. If desired, however, one of the belt dressings advocated by leather belt manufacturers and turned out under their guarantee may be used to keep the belt in pliable condition. Such dressings are made of animal fats and do not rot the leather fibres, as is the case where rosin or mineral oils are used.

If a belt becomes oil soaked it is best cleaned by washing in gasoline or a mixture of carbon tetrachloride and gasoline. A good belt dressing should then be applied, as specified previously.

Belts must be protected from water or drippage, or they will soon rot. If one of the laps becomes loose the belt should be immediately removed and taken to a concern specializing in belts, so that the seam may be re-cemented in place. If this is not done

immediately the belt will probably tear and then require a new section, if not an entire new belt. If a new piece of leather is used for the patch this hard section will cause the belt to bump each time the new section goes over the pulley. It is preferable that a section from an old belt be used to repair a belt, as it has been stretched and is more pliable than a new piece.

Water Test

After all connections have been completed the motor should be started and the compressor run without load. This is accomplished by having the suction shut-off valve (1) closed and the discharge shut-off valve (3) closed; that is, stem all the way in, in each case. The purge on each valve; that is, (36) on suction valve (1) and purge (11) on discharge shut-off valve (3) must be opened before starting the apparatus. By setting the valves in this fashion air will be drawn into the open purge (36) on the suction shut-off valve and be discharged from the open purge (11) on the discharge shut-off valve (3).

With the valves set as specified, the water outlet valve (18) should be adjusted so that the water switch (S) operates properly and the machine can be started and stopped by turning water on or off at the water inlet valve (17).

This water switch (S) was usually set for proper operation at the factory, but if the operator happens to be working on an old or overhauled unit it may be that a new gasket has been installed in the water switch and the setting changed somewhat. If the rubber stock used for a gasket happens to vary from that originally employed it will be necessary to readjust for correct operation. The on and off action should result in the electric switch acting quickly; that is, making or breaking contact with a snap action. It will be observed that the switch plunger will move a certain distance without any motion being transmitted to the electric switch, but when the electric switch does operate it should do so suddenly. If delayed in making or breaking contact the switch may be burned through arcing.

Another simple method of testing the water switch and the starting mechanism was to remove the belt so that the motor could be operated without turning over the compressor.

Valves

In general, all valves are plain shut-off valves, the seat and stem of which are so arranged that the valve is closed by turning the stem to the right or clockwise (stem in) and when seated (stem in all the way) forms a shut-off in the line to which it is connected. This holds true for all valves in the McClellan system, except the following:

The suction shut-off valve (1) connected between the suction line and the compressor is arranged so that when the stem is in the closed position the suction line is cut off from the compressor. Purge valve (36) at the same time is cut off from the suction line but is open to the compressor. When the suction shut-off valve stem is in the open position (stem out all the way) both compressor line and purge valve (36) are open to the suction line.

Discharge shut-off valve (3), located at the top of the condenser, is so arranged that regardless of the position of its stem, valve (4) receives pressure from the discharge line of the compressor. When the stem of discharge shut-off valve (3) is closed and seated (stem in all the way) the compressor is shut off from the condenser.

Charging Valve

A charging valve (7) is connected to the liquid line and has a charging flange (14) connected to it. This charging valve (7) is generally connected directly to the king or receiver shut-off valve (6) by means of a pipe nipple. For details of these valves refer to the bottom view of piping, given in illustrations 5, 6 and 7.

When the stem of the charging valve (7) is in the closed position (stem in all the way), the charging flange is shut off from the liquid line and receiver. When the stem is off its seat and in the open position (stem out) the charging line is then open to the liquid line and receiver valve (6).

Valve (11) is a check valve which allows the high pressure or compressed ammonia vapor to pass from the compressor to the condenser, but checks the passage or return of gas in the opposite direction when the machine stops operating. The early models were equipped with a purge outlet at the top of check valve, as shown in Figs. 5 and 6. The stem on valve (11) when closed, merely shuts off the purge outlet and has no effect upon the check valve itself. In

some of the later models the check valve was not equipped with a purge. Where this is encountered, unscrew the high pressure gauge from the valve (4) and allow this valve to act as a purge valve when evacuating air from the compressor, or system or when purging air.

The automatic constant pressure expansion valve used in McClellan installations operates in the opposite manner to any of the other valves in the system. Turning the stem to the right (clockwise) opens the valve, while turning it in the opposite direction serves to close the valve and to stop or restrict the flow of liquid through it. The back pressure is adjusted by manipulation of the expansion valve stem.

Preliminary Adjustment

The high pressure gauge (5) should be inserted in the side opening of gauge valve (4) and the low pressure gauge installed in the side opening of valve (19), which is inserted in a tee in the suction line. The gauges, unlike other threaded sections, should not be set in place with litharge and glycerine but should be inserted with either graphite paste or white lead on the threads, so that they may be easily removed, if desired. The valves to which the gauges are attached should not be left wide open; otherwise the needles or hands of the valves will vibrate violently. The needles or hands of the gauges should just move slightly and can be made to do so by adjustment of the stems of the stop valves in which the gauges are mounted.

Valves (3), (22), (36) and (6) should be opened (stems out all the way) and the stem on the expansion valve should be turned down to the right (clockwise) as far as possible, thus fully opening it.

Valves (1), (7), (8), (37), (10), (11) and (12) should be closed; that is, each with the stem in all the way.

In running the machine to make sure that the gauges are registering properly, valve (11) should be opened wide when starting and upon closing it slightly an alteration of pressure conditions should show up on gauges (5) and (20).

Blowing Out System

After the piping connections have been completed and checked by going over flanges to make sure they are tight, the system should be blown out with an air pressure of about 250 lbs. to remove loose particles of dirt and scale from the piping and any flakes of litharge which may have entered the system in making up the fittings. To do this the expansion valve should be disconnected and removed by unbolting the flanges and the liquid line temporarily connected to the coils by the use of a "jumper" pipe, that is, a piece of pipe which has been cut and provided with companion flanges so that it may be slipped into the place previously occupied by the expansion valve.

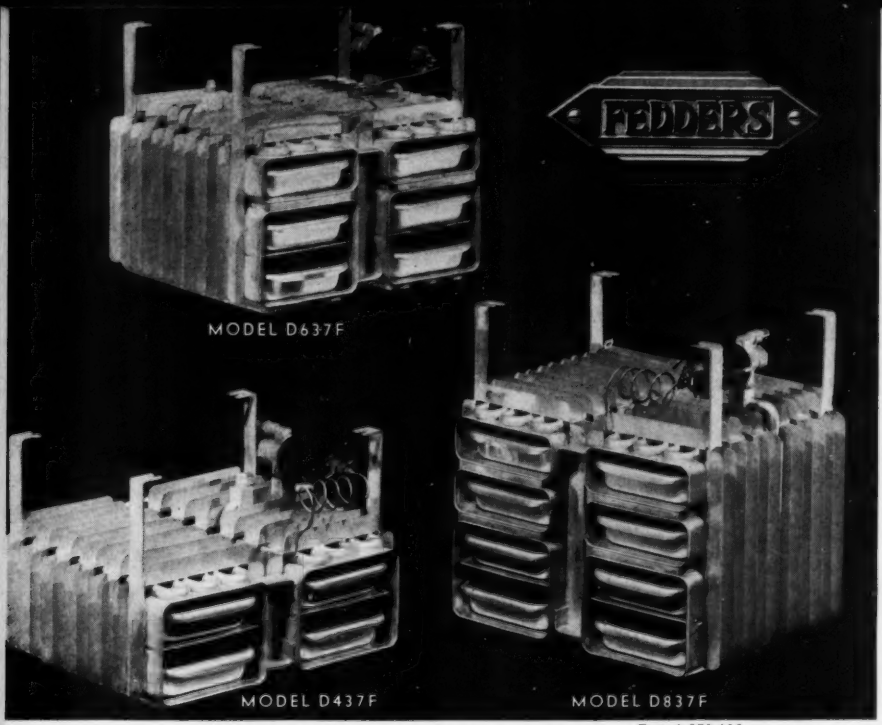
Keep Jumper for Future Use

Incidentally, this jumper piece should be made up properly, using litharge and glycerine on the joints, for it should be preserved for use against failure of the expansion valve. The shut-off valves used before and after the expansion valve can be used for crude expansion valves in the event of expansion valve failure by first removing the expansion valve and inserting the jumper piece. Thus, while the machine is operating temporarily with the jumper piece and refrigerating the box, the operator can dissemble the faulty expansion valve, determine the cause of improper operation, repair and reinstall it without necessity for haste, for the machine is in operation and the proper temperatures being held in the refrigerator.

With the jumper in place the suction line should be opened at some point near the machine, as, for instance, by removing the scale trap (13) and the opened end directed so that dirt blown from same will do no harm. Another way is to remove the low pressure gauge valve (19) and insert an oiled or greased plug so that it can be unscrewed easily and quickly with the fingers. It is best to remove this valve (19) and insert a greased plug, rather than to leave it in place and to use the port where the gauge (20) is screwed in place.

To Be Continued in the November Issue

Future articles will treat on the following subjects — Pumping Up an Air Pressure, Preparations for Charging Unit, Charging Connections, Vacuum Test, Removing Residual Air, Charging, Removing Ammonia Drum, Ammonia Charges, The Expansion Valve, Expansion Valve Regulation, Emergency Expansion Valve, Cleaning Expansion Valve, Gauge Pressures, Determining Correct Head Pressure, etc.



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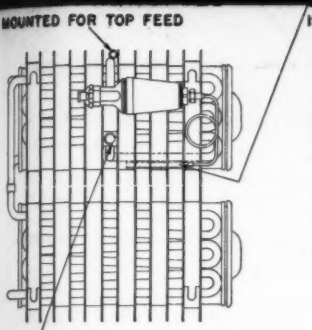

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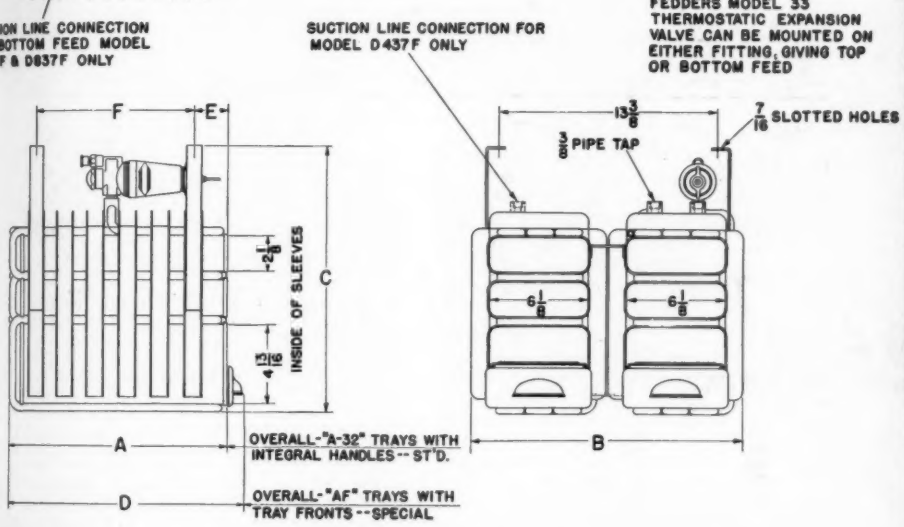

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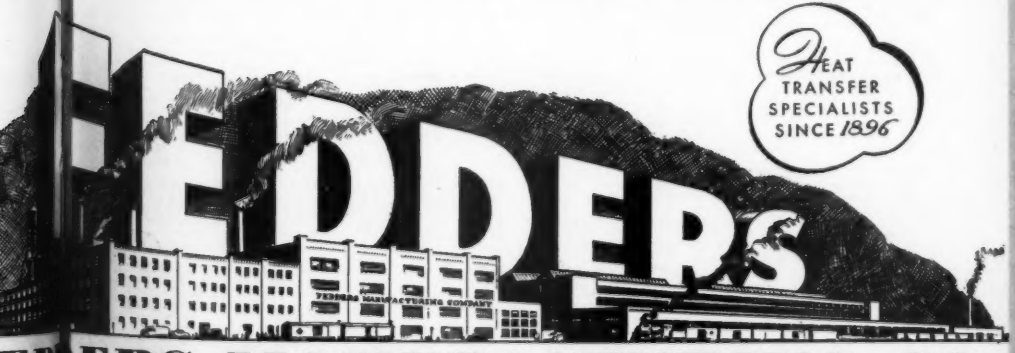

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To further the education and elevation of its members in the art and science of refrigeration engineering; for the reading and discussion of appropriate papers and lectures; the preparation and distribution among the membership of useful and practical information concerning the design, construction, operation and servicing of refrigerating machinery.

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MILWAUKEE CHAPTER NO. I, MILWAUKEE, WIS.: Meets on the 1st and 3rd Tuesdays of each month at the Metropolitan Hall, 541 W. Clark St. President, J. J. Geering; Secretary, Wray Heath, 2326 N. 50th St., Milwaukee, Wis.

MISSISSIPPI VALLEY CHAPTER NO. I, DAVENPORT, IOWA: President, J. L. Fish; Secretary, E. L. Bengston, 116 E. First St., Davenport, Iowa.

MONTGOMERY CHAPTER NO. I, MONTGOMERY, ALABAMA: Temporary President, Bruce G. Allen; Temporary Secretary, Carl C. Collins, 222 Dexter Ave., Montgomery, Ala.

NIAGARA FRONTIER CHAPTER NO. I, BUFFALO, N. Y.: Meets on the 2nd and 4th Wednesdays of each month at Langs Hall, East North and Fox Streets. President, D. B. Schuster; Secretary, W. S. Powell, 248 Springville Ave., Eggertsville, N. Y.; Recording Secretary, F. H. Walker, 2271 Elmwood Ave., Buffalo, N. Y.

ONTARIO MAPLE LEAF CHAPTER NO. I, TORONTO, ONT., CANADA: Meets on the 2nd and 4th Fridays of each month at the Carls-Rite Hotel, Toronto. President, A. E. Doan; Secretary, H. F. Nye, 80 Ontario Street, Toronto, Ont., Canada.

PITTSBURGH CHAPTER NO. I, PITTSBURGH, PA.: Meets on the 2nd Monday of each month in the Corporation Room of the Commonwealth Building. President, John Kirch; Secretary, F. V. Golitz, 1109 Pemberton St., Pittsburgh, Pa.

ROCKFORD CHAPTER NO. I, ROCKFORD, ILL.: Meets on the 1st and 3rd Monday of each month at the Nelson Hotel. President, George E. Moon; Secretary, Walter W. Larson, 1120 10th Ave., Rockford, Ill.

ST. JOSEPH CHAPTER NO. I, ST. JOSEPH, MO.: President, E. J. Storm, Secretary; H. E. Young, 305 S. 6th St., St. Joseph, Mo.

ST. LOUIS CHAPTER NO. I, ST. LOUIS, MO.: Meets on the 2nd and 4th Thursdays of each month at the German House, 2345 Lafayette St. President, E. Gygax; Secretary-Treasurer, E. A. Plesskott, 2145 67th St., St. Louis, Mo.

GREATER TOLEDO CHAPTER NO. I, TOLEDO, OHIO: Meets on 2nd and 4th Wednesdays of each month at Toledo Edison Serv. Bldg. President, A. J. King; Secretary, H. C. Benington, 139 N. Erie St., Toledo, Ohio.

TRI-COUNTY CHAPTER, ILLINOIS: President, Harvey Burgess; Secretary, B. V. Clark, 612 N. May St., Aurora, Ill.

TWIN CITIES CHAPTER NO. I, ST. PAUL, MINN.: Meets on the 2nd Tuesday of each month at the Midway Y. M. C. A., at 1977 University Ave., St. Paul. President, A. E. Johansen; Secretary, B. J. De Lange, Como Station, Route 3, St. Paul, Minn.

YOUNGSTOWN CHAPTER NO. I, YOUNGSTOWN, OHIO: Meets on the 1st and 3rd Monday of each month at the Central Y. M. C. A. President, Martin Bokesch, Sr.; Secretary, M. W. Bokesch, Jr., 2323 Mahoning Ave., Youngstown, Ohio.

Plans All Set for Big Chicago Convention

THOUGH the Chicago Convention Committee is still hard at work in the perfection of the minor details for the convention to be held at the Stevens Hotel, November 3-4-5, the plans are all set, and Chicago is ready to show you the time of your life. Profiting by the experiences of convention committees of former years, and with the aim in view of bigger and better conventions year after year, the Chicago Committee has developed a program that cannot be excelled, and will go down in the history of the Refrigeration Service Engineers' Society as something to be remembered and pointed to always as an outstanding affair.

On arriving at the Stevens, it is urgently requested that after making your hotel reservations, you immediately visit the convention registration desk to insure your place at the Annual Banquet, and other activities of the entertainment program. It will be only through registering that you will obtain your tickets to these affairs, the cost of each being included in the registration fee.

Special rates have been obtained at the Stevens and other hotels for your convenience. Since all the activities will be held in the Stevens Hotel, and since the accommodations there are better than can be obtained elsewhere, it is recommended that as many as possible avail themselves of these special rates at the convention hotel.

Rates—Stevens Hotel

Room with double bed and bath for one, $2.50, $3.00, $3.50, $4.00, $5.00, $6.00.

Room with double bed and bath for two, $4.00, $4.50, $5.00, $6.00, $6.50, $7.00, $8.00.

Room with twin beds and bath for one or two, $5.00, $6.00, $7.00, $8.00, $10.00.

Parlors and sample rooms, $5.00 and up.

Rates—Harrison Hotel

Single rooms, $2.50 and up.

Double rooms, $3.00 and up.

There will be other conventions in the city during the week of November 3-4-5, and no doubt hotels will be well filled. For this reason it is suggested you make your reservations well in advance of the convention.

Entertainment Program

For the entertainment of the visitors, three major parties are planned, starting off the first night with the Annual Banquet and Dance. For this night, a ten-piece, widely-known orchestra will supply the music, and seven assorted theatrical acts, picked from such well-known theatres as the Palace, Chicago, Oriental or State and Lake, will entertain you while you eat.

The second night will be the Carnival or Exhibitors Night. This affair will be held in the exhibit hall. A five-piece orchestra and several comedy acts, together with the costumes and scenery, will create the atmosphere of a carnival. This night is intended as a contrast from the more or less formal affair of the first night, and will be devoted entirely to a rollicking good time, in which everyone will participate. For this night, also, there will be gaming devices, with professional operators. Phony money will be provided with which to play. Prizes will be awarded to those holding certain numbers.

The third and last night will be the Cabaret, or Ladies' Farewell Party. The party will be conducted entirely along the lines of the modern-day cabaret, with music and entertainment to carry out the effect.

Entertainment for the ladies during the day, and apart from that described in the foregoing, has been arranged, and the outline of activities appears elsewhere in this issue.

Prizes for all the affairs, including the ladies' daytime activities, have been provided by the various exhibitors, as follows:

Prizes to Be Awarded

Prest-O-Lite 5-in-1 Outfit — The Harry Alter Co.

Chrome Cocktail Shaker, with tray and 6 glasses—Ansul Chemical Co.

Merchandise Certificate—Automatic Products Co.

No. RF set of Bonney Refrig. Sockets—Bonney Forge & Tool Wks.

Two Golf Bags—H. Channon Co.

Two Electric Desk Clocks — The Dayton Rubber Mfg. Co.

National Officers—R. S. E. S.

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S. A. LEITNER, Kansas City
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National Secretary

E. A. PLESSKOTT, St. Louis
Sergeant-at-arms

Two Waffle Irons—Detroit Lubricator Co.

Carving Set—E. I. duPont de Nemours & Co.

Two 5-piece Screw Drive Kits — Duro Metal Products Co.

Cocktail Set—Fedders Manufacturing Co.

Two Koll Rolls—Imperial Brass Mfg. Co.

Cocktail Set and Center Piece — Mueller Brass Co.

Large Electric Toaster—Peerless of America, Inc.

Two Schaeffer Fountain Pen and Pencil Sets—Penn Electric Switch Co.

Credit Voucher for $10.00 on Stevens Hotel—Ranco, Inc.

Two Onyx Electric Home Clocks—Rotary Seal Co.

Two Tool Kits—Snap-On Tools, Inc.

After-dinner Coffee and Cocktail Set—Tecumseh Products Co.

The American Brass Co. and Mills Novelty Co. will also furnish prizes.

Educational Program

The business meetings each day will be held during the hours from 10 a.m. to 1 p.m., allowing the entire afternoon of each day for the inspection of the many fine exhibits, and visiting of local factories and points of interest, according to the wishes of the individual.

The first day of the meetings will be devoted entirely to business, and the reports of officers and committees.

The second day is the first of the educational program, and will include speakers on such interesting and educational topics as:

Not one single defective AP Valve returned in almost one year

McKinley Refrigeration Supply Co.
By John McKinley.

JOHN McKINLEY
McKinley Refrigeration Supply Co.
Fort Worth, Texas

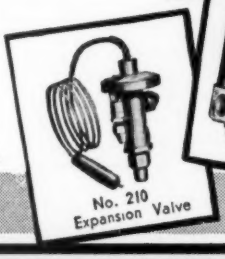
Go to Your Jobber For Your A-P Controls

Freedom from Defects, is inevitable under the careful precision methods with which all A-P Valves are manufactured!

That's why service men, dealers, and supply jobbers everywhere are installing more A-P Solenoids, and Thermostatic Expansion Valves, than ever before! Engineers and service men like the extreme simplicity of A-P Controls . . . Both the Thermostatic Expansion Valves and 73 RB Solenoid require only a moment to inspect or clean.

No. 220 K

A-P Valves satisfy with their dependable operations under all conditions.
"Time and Money Savers" — A-P Controls! Use them every chance you have.
Progressive Jobbers Everywhere Stock A-P Controls! . . . .



No. 210 Expansion Valve

No. 73RB

AUTOMATIC PRODUCTS COMPANY
2454 NORTH THIRTY — SECOND STREET
MILWAUKEE WISCONSIN

Board of Directors—R. S. E. S.

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Member, Board of Directors

C. BUSCHKOPF
Beaver Dam, Wis.
Member, Board of Directors

GEORGE H. CLARK, Chairman
National Educational and
Examining Board

1. The Application and Adjustment of Controls as Applied to Air Conditioning.

2. The Independent Service Organization and a National Service Organization.

3. Merchandising — Whether it be of a tangible nature, or intangible, such as selling of contracts.

4. Heat Transfer Surfaces for Refrigeration.

The outstanding feature of this day's program will be the talk entitled "Merchandising," which will be presented by Jerry Stedman. Mr. Stedman is a nationally-known speaker on this subject, and further details concerning him may be learned in other columns of this issue.

The third day's meeting will include such subjects as:

1. Business Management and Credit.

2. A Typical Air Conditioning Job.

3. A Moving Picture Showing the Operation of an Expansion Valve, by the Frigidaire Corp.

4. Service Analyzer.

In order that papers may not be limited to length so as to accommodate our program, arrangements have been made to have all papers printed prior to the convention, and presented to the assembly previous to the presentation of the speaker. Speakers will be limited to approximately 15 minutes each, during which time the paper will be discussed, but not read. Questions from the floor on the paper will be answered by the speaker.

You'll find them better
ALL WAYS
STOCKED by leading jobbers everywhere, Weatherhead valves and fittings include all necessary and essential parts for refrigeration installations.
See our new refrigeration catalog for complete listings. Mailed on request.
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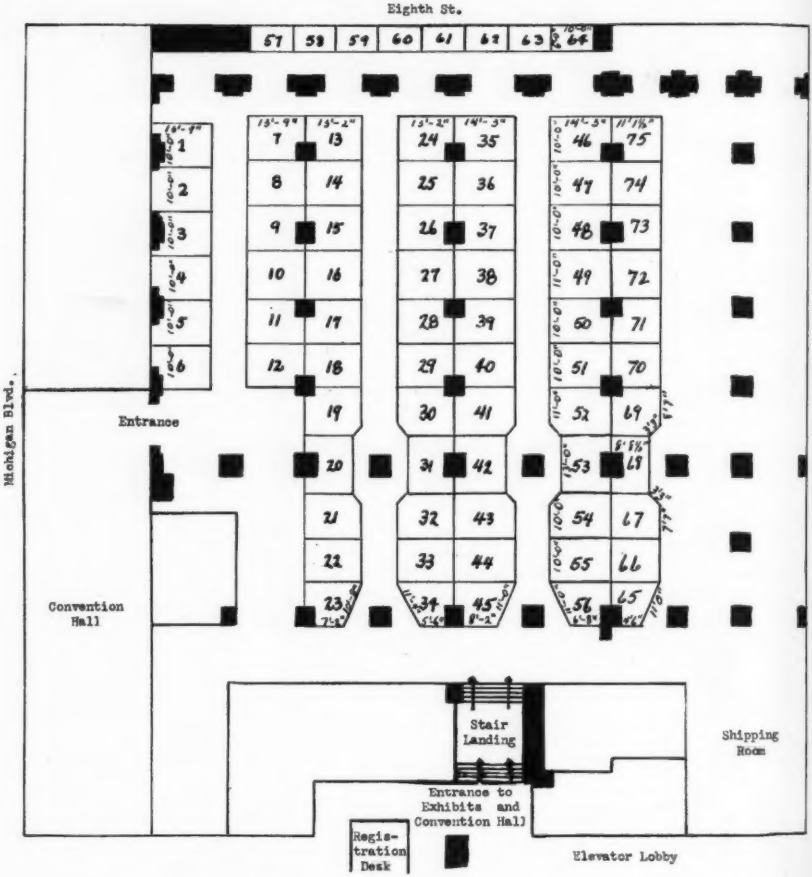
Where to Find Them



The Exhibitors and Where to Find Them

A very impressive and educational part of this convention will be the large display of the latest equipment and service methods by the various exhibitors. The exhibition section will be adjoining the assembly hall, as will be noted by the plat showing the layout of the exhibit spaces. Following is a list of the exhibitors to date, and where you may find them:

Booth No.	Exhibitor
1	Duro Metal Products Co., Chicago, Ill.
2	Alco Valve Co., St. Louis, Mo.
3	Commercial Coil & Refrig. Co., Chicago, Ill.
4 and 5	Penn Electric Switch Co., Goshen, Ind.
6	Rotary Seal Co., Chicago, Ill.
7	Art Valve Co., Chicago, Ill.
8	R. & H. Chemicals Dept., Wilmington, Dela.
9	Modern Equipment Corp., Defiance, O.
10	Mueller Brass Co., Port Huron, Mich.
11 and 12	Peerless of America, Inc., Chicago, Ill.
13	Servel, Inc., Evansville, Ind.
14	Marlo Coil Co., St. Louis, Mo.
15	Airo Supply Co., Chicago, Ill.
16	James P. Marsh Corp., Chicago, Ill.
17	South Bend Lathe Works, South Bend, Ind.

A very special copper tube

FOR REFRIGERATION • OIL BURNER • AIR CONDITIONING
BEST QUALITY • MIRROR FINISH • DEAD SOFT

REVERE "Dryseal" Copper Tube is made of pure, deoxidized copper, soft annealed for easy flaring and bending. Mirror finish interior produced by an extra finishing operation. Soft, uniform temper and fine, even grain structure assured by careful electrical heat treatment. It is free from oxide—every inch bright, smooth and dry. Comes in 9 sizes ranging from 1/8″ to 3/4″ O.D. Wall thickness, 0.035″. Either plain copper or tinned. Sizes 1/4″, 5/16″, 3/8″ and 7/16″ are listed under the Re-examination Service of Underwriters Laboratories, Inc. Shipped in 50-ft. spiral-wrapped coils, with ends sealed to exclude dirt, air and moisture. Revere "Dryseal" Copper Tube is made with the utmost care to maintain just the right characteristics for refrigeration, oil burner and air conditioning line requirements. Order a sample lot from the Revere distributor nearest you. If you do not know him, write us direct. Please address inquiries to our Executive Offices, 230 Park Avenue, New York City.

Revere Copper *and* Brass

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18 Henry Valve Co., Chicago, Ill.
19 Automatic Heating & Cooling Supply Co., Chicago, Ill.
20 Chicago Wilcox Co., Chicago, Ill.
21 L. H. Gilmer Co., Philadelphia, Pa.
22 Herman Goldberg Co., Chicago, Ill.
23 Ranco, Inc., Columbus, Ohio.
24 Kellogg Compressor & Mfg. Co., Rochester, N. Y.
25 Snap-On Tools, Inc., Kenosha, Wis.
26 Zenith Carburetor Co., Detroit, Mich.
27 and 28 Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
29 American Injector Co., Detroit, Mich.
30 Fedders Manufacturing Co., Inc., Buffalo, N. Y.
31 Kold-Hold Manufacturing Co., Lansing, Mich.
32 Kerotest Manufacturing Co., Pittsburgh, Pa.
33 Business News Publishing Co., Detroit, Mich.
34 Detroit Lubricator Co., Detroit, Mich.
35 General Electric Co., Cleveland, Ohio.
36 Victor Manufacturing & Gasket Co., Chicago, Ill.
37 Howe Ice Machine Co., Chicago, Ill.
38 Tecumseh Products Co.,Tecumseh, Mich.
39 American Radiator Co., New York, N. Y.
40 The Starr Co., Richmond, Ind.
41 Bonney Forge & Tool Works, Allentown, Pa.
42 Borg-Warner Service Parts Co., Chicago, Ill.
43 Automatic Products Co., Milwaukee, Wisc.
44 Harry Alter Co., Chicago, Ill.
45 Detroit Lubricator Co., Detroit, Mich.
46 Bush Mfg. Co., Hartford, Conn.
47 Kelvinator Corp., Detroit, Mich.
48 Dayton Rubber Mfg. Co., Dayton, Ohio.
49 Perfection Refrigeration Parts Co., Harvey, Ill.
50 and 51 Imperial Brass Manufacturing Co., Chicago, Ill.
52 Wolverine Tube Co., Detroit, Mich.
53 Rempe Co., Chicago, Ill.
54 Mills Novelty Co., Chicago, Ill.
55 Cutler-Hammer, Inc., Milwaukee, Wis.
56 Ansul Chemical Co., Marinette, Wis.
57-58 Copeland Refn. Corp., Detroit, Mich.
59 Spoehrer-Lange Co., St. Louis, Mo.
60 H. Channon Co., Chicago, Ill.
61-62 Virginia Smelting Co., West Norfolk, Va.
63 Universal Cooler Co., Detroit, Mich.
64 G. & G. Genuine Majestic Refrigerator & Radio Parts Service, Chicago, Ill.
65 Rex Refrigeration Service, Chicago, Ill.
66 Weatherhead Co., Cleveland, Ohio.
67 American Brass Co., Waterbury, Conn.
69 F. H. Langsenkamp Co., Indianapolis, Ind.
70 Brunner Manufacturing Co.,Utica, N.Y.
72 Syntron Co., Homer City, Pa.

THE PRESIDENT'S MESSAGE

TO many readers of the REFRIGERATION SERVICE ENGINEER the word convention spells vacation, good times, a trip to a large city, a great show of exhibits, hearing of lectures by outstanding speakers in the industry, the making of new friends, and last but not least renewing the many fine friendships we have made in previous years.

Next month we shall again meet at our fourth annual convention, this time in the good city of Chicago as guests of the Chicago Chapter, one of the oldest chapters in the organization and also the largest. For months they have been hard at work to make this the largest and best convention the association has held so far and judging by all reports they will present us with the greatest spectacle in the way of exhibits and entertainment ever witnessed by this branch of the refrigeration industry.

But there is only one way to make such a convention a success—and that is by all of us being there during the three days, or better, during the entire first week of November, because entertainment has been provided for not only the three days of official convention, but for the entire week. All the manufacturers of various products will throw their doors open to the visitors from all over the country. You may visit the many service organizations in the city and see just how they take care of the service problems in a large city like Chicago.

The large jobbing houses will welcome you and show you what goes on behind the scenes when you send in your orders to be filled.

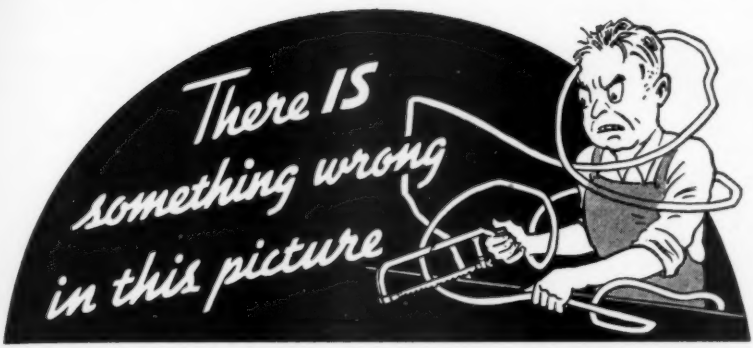
The manufacturers, engineers, and sales managers will welcome the opportunity to meet you personally and to talk to you about your problems, because your problems are also their problems.

There will be entertainment galore both on a large scale as at our banquet and in smaller ways at the various manufacturers' booths and their suites. The best of everything within our reach has been provided for your pleasure and we feel sure that you will long remember this event.

Food is unexcelled at the Stevens Hotel. They have the staff and the experience to take care of any number of people.

I will not talk about the exhibits, but you know that the manufacturers are going to do their utmost to give you a real show and display their products in both an advanta-

(Continued on Page 62)



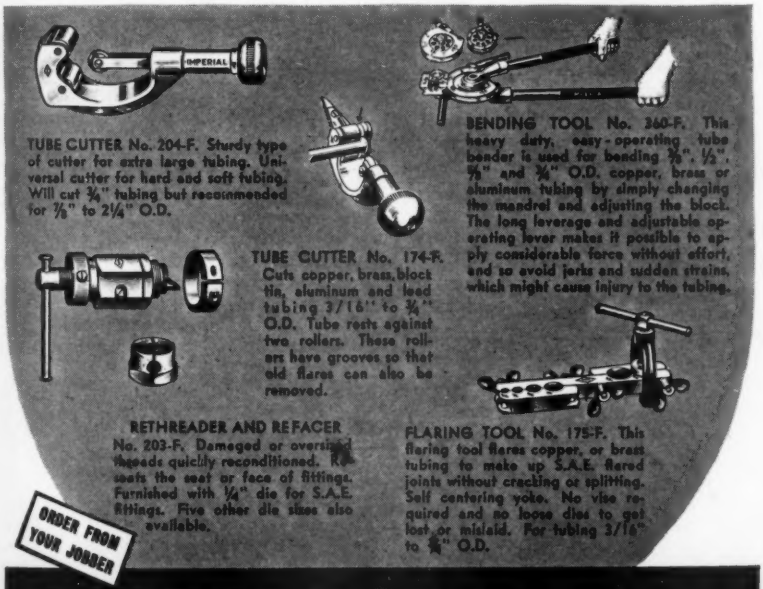
--and Imperial tools for refrigeration work would quickly correct it

MAYBE this picture is just a trifle exaggerated but there is no doubt about the fact that tubing work can be mighty exasperating.

Installation and service men are taking a three way crack at the tubing problem. First they are using Imperial copper tubing. Then they are using the various Imperial connecting fittings and, third, they are using Imperial tools.

Write for detailed information or ask your jobber about Imperial's complete line of inexpensive service tools that take all the grief out of tubing work.

IMPERIAL BRASS MFG. CO., 1204 W. Harrison St., Chicago, Ill.


IMPERIAL
TUBE CUTTER No. 204-F. Sturdy type of cutter for extra large tubing. Universal cutter for hard and soft tubing. Will cut ¾" tubing but recommended for ⅞" to 2¼" O.D.
BENDING TOOL No. 360-F. This heavy duty, easy-operating tube bender is used for bending ⅜", ½", ⅝" and ¾" O.D. copper, brass or aluminum tubing by simply changing the mandrel and adjusting the block. The long leverage and adjustable operating lever makes it possible to apply considerable force without effort, and so avoid jerks and sudden strains, which might cause injury to the tubing.
TUBE CUTTER No. 174-F. Cuts copper, brass, block tin, aluminum and lead tubing 3/16" to ¾" O.D. Tube rests against two rollers. These rollers have grooves so that old flares can also be removed.
RETHREADER AND REFACER No. 203-F. Damaged or oversized threads quickly reconditioned. Refaces the seat or face of fittings. Furnished with ¼" die for S.A.E. fittings. Five other die sizes also available.
FLARING TOOL No. 175-F. This flaring tool flares copper, or brass tubing to make up S.A.E. flared joints without cracking or splitting. Self centering yoke. No vise required and no loose dies to get lost or mislaid. For tubing 3/16" to ¾" O.D.
ORDER FROM YOUR JOBBER
IMPERIAL Air Conditioning and Refrigeration Products

Convention Committee Ready to Greet You

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RAY POLLEY, Exhibitors
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4th Annual

R.S.E.S. CONVENTION

STEVENS HOTEL • CHICAGO

Booth No. 44

At Main Entrance

Get a Harry Alter Cane!

And always keep the DEPENDABOOK for handy reference. The most complete buying guide—We give prompt service—Same Day Shipments—At America's Lowest Prices.

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THE HARRY ALTER COMPANY

1728 S. Michigan Ave., Chicago

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More Members of the Convention Committee

Upper Left—Fred Roth, Membership, All Makes Refrigeration Service Co. Upper Right—E. W. Scotten, Refrigeration, Airo Supply Co.

Lower Left—H. D. Busby, Educational, The Refrigeration Service Engineer. Lower Right — Harry Drownes, Auditing, Drownes Refrigeration Service.

Additional members of the Convention Committee, whose pictures arrived too late for publication are: Mr. George Monjian, Entertainment, Chicago Refrigeration Service Co.; Mr. R. L. Hendricksen, Educational.

THE PRESIDENT'S MESSAGE

(Continued from Page 58)

geous and entertaining manner. There will be operating models and stationary displays which will delight all of us.

The meeting hall will be but a few steps from all the exhibits and you will thus be able to get from one place to the other with the least amount of lost time and get the greatest possible benefit from this part of the convention.

The ladies will indeed welcome the opportunity to visit the famous shopping district in the "LOOP" and to see the large department stores and to visit some of the beautiful theatres for which the city of Chicago is famous. They will enjoy sight-seeing, a gorgeous drive along the Lake Shore Drive, past Soldier Field and the aquarium, to Jackson Park with its fine monuments and the enormous "Julius Rosenwald Museum." Or an equally beautiful tour through Lincoln Park along the lake front and north through the residential districts of the north shore.

In fact if both you and your wife attend everything provided for your pleasure, you will see very little of each other except in the evenings at the parties.

I could go on telling about the program but that would leave nothing for your imagination. Just one thing more, and that is—nowhere else have you ever seen so much and received so much in the way of entertainment and pleasure as you will at the convention of the Refrigeration Service Engineers Society this year.

See you in Chicago!

PAUL JACOBSEN, *National President.*

GREETINGS FROM THE PRESIDENT OF THE CHICAGO CHAPTER

ON behalf of the Chicago Chapter, I wish to extend greetings and a hearty wel-

WHAT IS GOOD FOR THE BOX IS GOOD FOR THE *Service Man*

Experienced service men know the increasing number of leading refrigerator manufacturers who standardize on Cutler-Hammer Control. They can guess at the thorough and exhaustive tests that went on beforehand. They know that this increasing standardization can have but one meaning.

What's best for the box is best for the service man. That's why more and more service men solve the whole problem of what control to use for replacement service —by standardizing, themselves, on Cutler-Hammer Control. Only C-H Replacement Control can give you C-H features of design. Write for literature. CUTLER-HAMMER, Inc., *Pioneer Manufacturers of Electric Control Apparatus,* 1363 St. Paul Ave., Milwaukee, Wis.

Check These Outstanding Features of C-H Refrigeration Control

- ✓ 4 models meet nearly every need
- ✓ Famous C-H overload protection now available for replacement control
- ✓ C-H settings are *dependable;* stay the way you set them for years
- ✓ All wanted advantages: cold control; defrost position; adjustable temperature and pressure range; each model fits large or small openings; mounts horizontally or vertically; simple connections.

CUTLER-HAMMER
REPLACEMENT CONTROL
C-H

IVAR SKIPPLE, President Chicago Chapter

come to all the visiting members and their friends who will attend the Fourth Annual Convention of the Refrigeration Service Engineers' Society, to be held at the Stevens Hotel, November 3-4-5.

Through the cooperation of the exhibitors and the hard work of our convention committees, an educational and entertainment program far superior to any in your experience has been prepared for your enjoyment during your stay with us.

I wish to extend a special invitation to the ladies. In the past, the ladies have attended our conventions in comparatively small numbers, but those who did attend enjoyed a good time. This year, through the hard work of our Ladies' Committee, arrangements have been made to occupy every minute of the visitor's time with a program of entertainment which you will always remember. Don't stay home with the plan of reading about it. Come and see it for yourself.

We are grateful to the exhibitors for the cooperation they have shown the organization, making it possible to assemble the finest display of equipment and supplies for the serviceman that it is possible to obtain. The success of the coming convention can be accurately gauged by the fact that the original allotted space for exhibits has been entirely sold out, making it necessary to open additional space. This space, too, is going fast.

Chicago is ready to greet you, and is proud of the opportunity of being your host. We hope you will become our guest.

IVAR SKIPPLE, *President Chicago Chapter.*

Refrigeration Service Engineers!

when in Chicago make your headquarters at

H. CHANNON CO.

133 N. WACKER DRIVE

The latch-string is always out to YOU!

GREETINGS FROM THE PRESIDENT OF THE PARTS MANUFACTURERS' ASSN.

"ANOTHER Refrigeration Service Engineers' Society Convention, and the members of the Refrigeration Supplies & Parts Manufacturers' Association are looking forward with pleasure to meeting all of you and to exhibiting their products for your interest.

"It is always a welcome privilege to manufacturers to meet the people who actually use their products—to get their viewpoints and suggestions first-hand.

"Likewise, the exhibits by the manufacturers should be of interest to all Service Engineers, who no doubt, have been waiting for the opportunity to meet the manufacturers of the products they use every day, because those products are a very important part of the Service Man's business.

"The November Convention is the only National meeting of the year held by your Society, and to make it a success, you should attend. Chicago is centrally located and easy and economical to reach by either rail or automobile.

"In addition to the educational and instructive part of the program, various committees have given liberally of their time to plan entertainment which will make your

J. D. COLYER

visit to Chicago an enjoyable one, and we members of the Refrigeration Supplies & Parts Manufacturers' Association will be glad and ready to do all we can to make it worth your while to be there."

J. D. COLYER, *President.*

"THE WHOLE TRUTH—
and nothing but the truth"

High Pressure

Low Pressure

WHEN the pointer of a Marsh Ammonia Gauge comes to rest you can rely on its testimony . . . and, thanks to the Marsh Recalibrator, you can KEEP IT HONEST!

When a Marsh gauge is knocked out of adjustment you don't pull the hand off and set it back to zero—a practice that merely corrects a gauge at the zero point and fails to correct it at other points. All that you do is simply turn the Marsh Recalibrator screw until the gauge is correct at zero and this patented feature resets the gauge throughout its entire range—truly re-calibrates it.

These Marsh gauges for refrigeration work have many other superior features such as the patented stabilizer that protects against sudden shocks, and the patented dial arrangement which provides easily read 1 lb. divisions in the low pressure operating range.

Write for complete information about these gauges and other Marsh instruments.

JAS. P. MARSH CORPORATION
2059 Southport Avenue CHICAGO, ILLINOIS

MARSH Refrigeration Instruments

G. E. STEDMAN, PROMINENT MERCHANDISER TO SPEAK AT CONVENTION

ONE of the highlights of the Chicago convention educational program will be a talk on the subject of merchandising by Mr.

G. E. STEDMAN

G. E. Stedman of the Cramer-Krasselt Company. Mr. Stedman is a nationally-known speaker on the subject of appliance merchandising. Following is a resume of his experience.

Mr. G. E. Stedman has been with the Cramer-Krasselt Company, a well-known advertising agency of Milwaukee, since 1929, and previous to his present position occupied an executive position with the Winningham Agency. Prior to that he had wide experience as general field manager for a large cereal company.

At present he is vice-president in charge of Market Planning for his company, and has developed the market and research department of this agency to where it is one of the best known in the country. For the past five years, he has supervised national market studies for Norge Division, covering the entire appliance field in which they are interested. These studies have become the most authentic in the industry. He has also supervised all market research work for major clients. In addition to this, he has acted as public relation counsel.

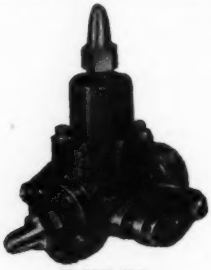
Mr. Stedman is one of the best authorities on appliance merchandising, having made, and continues to make, a thorough study of market and economic trends of this field. He is contributing editor to *"Electrical Mer-*

Refrigeration and Air Conditioning Controls Available in Types and Sizes to Suit Your Requirements.

WRITE FOR OUR CATALOG

TYPE WRBP

Pilot Operated Water Regulator Size ¾" to 2½" P.T.



TYPE RB

Back Pressure Regulator ¾" Port, with ¾" P.T. or Fittings for Copper Tubing

TYPE SILOWATT

Solenoid Valve ⅜" P.T. ⅛" Port Size

THE ELECTRIMATIC CORPORATION

2100 INDIANA AVE., CHICAGO, ILL.

chandising," and his articles appear monthly. He has conducted sales training courses throughout the United States. Early this year, he instituted throughout Kansas City and Missouri such a course, and as a result of the application of the principles of this course, this market has been free of the bad practices that characterize a highly saturated market. Appliance dealers have made more money than ever before. He was instrumental in putting into effect fair trade practices among appliance dealers there, and as a result chiseling and price-cutting have been eliminated.

Jerry Stedman is an able public speaker, having appeared before sales groups, advertising groups, appliance meetings, and many other convention and association meetings. He has addressed the American Management Association meeting in New York, the Sales Executive Club of New York, the Toronto Advertising Club, and many others too numerous to mention. He has just returned from a trip to Dallas and Oklahoma City, where he addressed a series of N.E.M.A. meetings, under the sponsorship of Norge.

He knows thousands of merchants and salesmen around the country, and in the words of Les Moffatt, editor of *Electrical Merchandising*, he "lives, eats and breathes appliance selling." He has a wide following among salesmen and merchants, who are regular readers of his articles on appliance salesmanship.

* * *

PLANNING FOR MANUFACTURERS' AND JOBBERS' MEETINGS

Upon the invitation of the REFRIGERATION SERVICE ENGINEER, the gentlemen in the group on the following page took time out of a busy day in planning the coming annual meetings of the National Refrigeration Supplies Jobbers' Association and the Refrigeration Supplies and Parts Manufacturers' Association to send their greetings to the Refrigeration Service Engineers' Society and express their best wishes for a successful convention next month.

At their respective conferences held in Chicago on October 5, details were worked out for their respective association meetings. The National Refrigeration Supply Jobbers' As-

ARTIC does not corrode metals or alloys generally used in refrigerator system construction, even if moisture is present. It operates efficiently in compact, light weight units with low power consumption. It gives controlled low temperatures down to —10° F. at POSITIVE pressures. For dependable refrigeration, specify and use ARTIC.

DU PONT
REG. U. S. PAT. OFF.

E. I. du Pont de Nemours & Co., Inc.
The R. & H. Chemicals Dept.
Wilmington, Del.
District Sales Offices: Baltimore, Boston, Charlotte, Chicago, Cleveland, Kansas City, Newark, New York, Philadelphia, Pittsburgh, San Francisco

ARTIC — THE PREFERRED METHYL CHLORIDE FOR THE SERVICE MAN

Left to Right: Samuel R. Bush, Secretary of Jobbers Association; Richard M. McClure, Secretary of Manufacturers Association; R. H. Spangler, President of Jobbers Association.

sociation opens its meeting at 9:30 A. M. Monday, November 1, and will occupy two full days and evenings. The Manufacturers are holding a one day meeting—on Tuesday, November 2. Both meetings will be concluded with a joint banquet held at the Stevens Hotel on Tuesday evening, November 2.

U.S. REFRIGERATION GAUGES
ARE HIGHLY SENSITIVE TO CHANGES IN PRESSURE!
PERMANENTLY ACCURATE
U.S. BUILDS BETTER GAUGES
U.S. GAUGE CO. N.Y.
U.S. GAUGE CO.
44 BEAVER ST., NEW YORK, N.Y.

LADIES' COMMITTEE PROGRESS

FOR the past month or so, the Chicago ladies have been actively engaged in the arranging of a suitable program for the visiting ladies to the National Convention. Officers have been elected, committees appointed, and several meetings held, accomplishing in a short time, a very comprehensive outline of the entertainment to be offered the visitors.

At one of the meetings during the formative period of the ladies' group, Mrs. H. Busby was elected Chairlady of the group, and Mrs. Ogden Armstrong, secretary. Work is continuing at a rapid rate, and it is expected that completion of their plans will be reached well in advance of the convention dates.

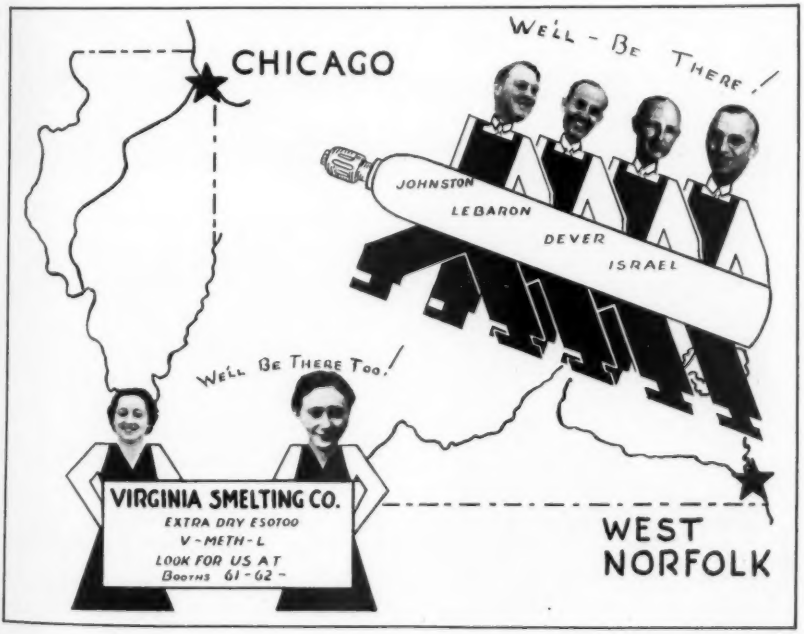
Special Invitation from the Ladies to the Visiting Ladies

Ladies: You simply must be there! We know, since the day Chicago was selected as the convention city for 1937, you have *thought* of making the trip, but the time is at hand now when you must *plan* to be in attendance. When you hear what is being planned for your entertainment and enjoyment, you will realize you cannot miss it. We know the men are going to be there, so don't let them leave you at home. Remember, this is just as much your convention as theirs.

Of course, you already know the evening features are for both the ladies and the men, but the Ladies' Committee is making great plans and efforts to arrange for your time during the day. It is the desire this year to deviate a little from the plans of former years. In view of the large attendance expected and the many points of interest to see in Chicago, we feel the ladies, themselves, should have the opportunity of choosing their own entertainment along this line. Varied suggestions will be available from which to make your choice, and by registering this choice with the committee on arrival, arrangements will be immediately made for your guidance and transportation.

The first day will be left open for the renewing of old acquaintances, the making of new friends, exploration of the Stevens, the world's largest hotel, and getting ready for the first big night—the Annual Banquet and Dance.

For the second day, a card and bunco



THE CHICAGO LADIES' CONVENTION COMMITTEE
First Row, Left to Right: Mrs. Otto Hladilek, Mrs. P. C. Krueger, Mrs. H. D. Busby, Mrs. Willis Stafford, Mrs. Ivar Skipple, Mrs. Ogden Armstrong.
Second Row, Left to Right: Mrs. Arnold Schroeder, Mrs. Percy Bossert, Mrs. Harry Drownes, Mrs. George Monjian, Mrs. John Strub, Mrs. Carl Whitcomb.

BARE COMPRESSORS and COMPLETE UNITS

All types for service replacement and new installations . . . One, two and four cylinder models from ¼ h.p. to 20 h.p. . . . For Sulphur Dioxide, Methyl Chloride or Freon.

Write for new catalog—a valuable reference for assemblers and service companies.

MERCHANT & EVANS COMPANY
Philadelphia, Pa., U.S.A., Plant at Lancaster, Pa.

party, to be held in the Stevens, is being planned, but for those who may not care to take part in that, arrangements for your choice of trips to various points of interest will be available.

The third day will be of your own choice, with the convention finale in the evening in the form of the Ladies' Farewell Party, with plenty of entertainment and fun.

At all the functions, there will be favors, prizes and suitable souvenirs to add pleasure to your visit.

We are expecting and planning for at least 500 ladies to be in attendance, and cordially invite you to help make our expectations a realization by being one of those 500.

We know you will like Chicago, and trust you will feel this party is yours.

S S S

ST. LOUIS CHAPTER

Meeting of September 9, 1937

By E. A. PLESSKOTT, *Secretary*
2145 67th St., St. Louis, Mo.

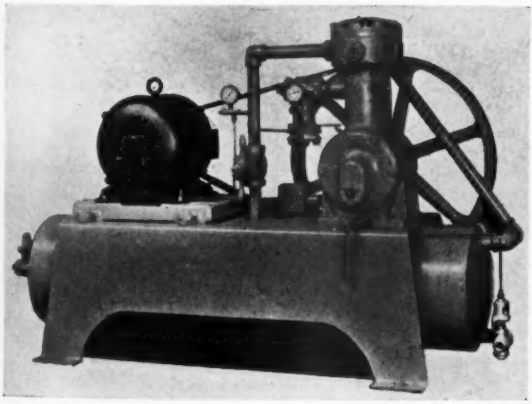
THIS meeting having been called for the prime purpose of making final arrangements for the Chapter's annual picnic, no speaker had been programmed, but a pleasant surprise was in store for the few that attended as Educational Chairman Tinkey had brought with him Mr. George Lindgren, chief engineer of the Copeland Co., who, at the conclusion of our business session, was pressed into service.

He gave freely of his engineering experience, and exhibited a compressor of his own design, which embodied a number of refinements over the old models.

President Gygax and Secretary Plesskott spoke briefly on the forthcoming R. S. E. S. Convention, and assured those present that if any member desired to go, and did not have transportation facilities, they would make every effort to put him in touch with someone who might be able to accommodate him.

Importance of a good turnout at our coming picnic was also stressed. Mr. Tinkey suggested the secretary give a short talk in the near future on the essential qualifications of a good service man, it being his opinion that there was no one in the Chapter better able to handle this subject, but due to press of business, he felt he would not be able to give the necessary time and thought it warranted.

Compressors & Condensing Units



Howe compressors and condensing units now available in sizes from ⅓ H.P. to 20 H.P.

The Howe line includes commercial fin coils, air conditioning coils, unit coolers and comfort coolers.

See our display Booth 37

HOWE ICE MACHINE CO.

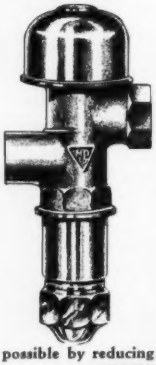
Manufacturers of refrigerating and air cooling equipment exclusively, for 25 years

2825 MONTROSE AVE., CHICAGO, ILL.

CANDID PICTURES OF ST. LOUIS PICNIC

1. The ladies try it. 2. Late comers digging in. 3. Batter up—Mrs. Vollman, L. W. Krueger catching. 4. Champ Vollman in action. 5. Mr. Krueger batting—just missed one. 6. C. Ott in conference—wonder what it is all about.

LOOK
$2.25



M. D. EXPANSION VALVES
EXTRA PROFITS
FULLY GUARANTEED

Free replacement within one year

M. D. EXPANSION VALVES will replace any make in domestic or commercial systems EXCEPT AMMONIA.

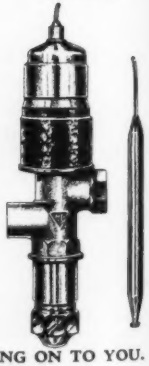
One model valve for all low pressure refrigerants to one ton Methyl or corresponding capacities in other refrigerants.

M. D. EXPANSION VALVES are designed with small friction points, tight shut off, positive adjustment, lead seal low side cap, and double seal high side cap. NO CHATTER. Liquid side ¼" S. A. E. flare; Suction side ¼" female iron pipe thread. Liquid line strainer furnished with all valves. Full range 16" vacuum to 30 lbs. back pressure. Air conditioning different springs if so ordered.

THREE MODELS to cover nearly all needs.

Never before have expansion valves been available to the service engineer at these low prices. M.D. EXPANSION VALVES are made of the best materials and workmanship — and GUARANTEED. New goods, no sacrifice in quality. Low prices possible by reducing our costs and jobbers' profit. WE PASS THIS SAVING ON TO YOU.

LOOK
$4.50



IMMEDIATE SHIPMENT **FACTORY TO USER**

One trial will convince the most skeptical.

All shipments are net F.O.B. factory, except orders of THREE or more with check enclosed, will be prepaid. WRITE—PHONE—or CALL the factory.

MECHANICAL DEVELOPMENT CO., Ltd.

1000 N. Orange Drive G. L. 8226 Los Angeles, Cal.

MADE RIGHT **PRICED RIGHT** **SOLD RIGHT**

Mr. Krueger was to try to make arrangements for September 23rd with a representative of the Hinsdale Tool Company to exhibit their latest line of refrigeration service tools.

Mr. Krueger appointed Mr. Petri, Mr. Plesskott and Mr. Vollman as his assistants for the coming picnic, laying out the work for each.

S S S

ST. LOUIS CHAPTER HOLDS ANNUAL PICNIC

ON Sunday, September 12th, the St. Louis Chapter, R. S. E. S. donned play clothes and made merry at Corisande Beach. This was their annual picnic—and a real picnic it was—what with the good old "hot dogs," ice cream, beer and pretzels, etc.

As in the past, this affair was made possible by the generous donations of The Harry Alter Co., Inc., Brass & Copper Sales Co., The Spangler Co., Inc., and the R. E. Thompson Co., and the hard work of picnic chairman L. W. Krueger and Messrs. E. Gygax, O. Petri, E. A. Plesskott and L. Vollman.

Mr. Thompson and Mr. Vollman were given the unofficial title of horse-shoe champs. The baseball game was of short duration due to the zest with which the "Samsons" attacked the sometimes elusive pill, which after such bombardment soon divested itself of its "inners."

"Polar Bear" Gygax was the first to brave the cold water of the Meramec, and was soon followed by Plesskott and Vollman, they being the only ones to venture forth on this cool but sunny day. Canoeing was in evidence too, and anyone interested in learning the secret of enjoying this sport without paddling, need only address the First Vice-President of the St. Louis Chapter.

Mr. Jerry Wilkerson took some motion pictures which he promised to exhibit at one of our Fall or Winter meetings, providing they turned out satisfactorily. Other pictures were taken by Mr. Gygax.

S S S

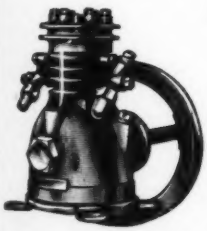
CAPITAL CITY CHAPTER

Meeting of September 10, 1937

By **M. H. HAMILTON,** *Secretary-Treasurer*

1522 Isherwood St., N.E., Washington, D. C.

THE meeting was called to order by President N. Matheson. Roll call revealed four visitors present, and was followed by



"Chieftain" Quality Built Compressors and Condensing Units

are designed to give you many years of quiet, efficient and trouble free service by Engineers who have been serving the refrigeration industry for the last fourteen years.

They have again "scored a hit" with a new "V" type four cylinder compressor which is designed for use with ½ to 1 HP motors. All of the advanced features that have proven so successful in "Chieftain" household and light commercial units are now incorporated in this new four cylinder model.

Mechanical improvements include, force feed lubrication to piston pin and connecting rod bearings, positive alignment of cylinder bores with main bearings by casting cylinders and crankcase in one piece. Adjustable suction shut-off valve, interchangeable parts with single and twin cylinder models. All compressor parts are machined to precision limits on up to date equipment and assembled in glass enclosed rooms where only filtered, dust free air is admitted.

Write for our latest descriptive catalog

TECUMSEH PRODUCTS CO., Refrigeration Division TECUMSEH, MICH.

the reading of the minutes of the previous meeting, and a communication from National Secretary H. T. McDermott.

Dues were collected, and Mr. M. H. Hamilton was appointed to act as treasurer in conjunction with his duties as secretary of the chapter.

Mr. S. J. Brill, our educational chairman, is to work out a program for three months in advance, having one business meeting and one educational meeting a month. Mr. S. L. Price suggested some member study the Lecture Course thoroughly and explain it, allowing one-half hour before each business meeting.

Discussion took place regarding the changing of our meeting place, and Mr. E. J. Uhthoff and President Matheson are to attempt to secure a hall at 2nd and Upshur Streets for the 1st and 3rd Wednesdays of each month.

S S S

MEMPHIS LADIES AUXILIARY

By MRS. C. G. (HOOT) GIBSON
333 S. Parkway E.

THE ladies of Memphis are again asking you to accept our apologies for not having the usual "social" report in the last magazine.

At our social meeting for May, held at the home of Mrs. Bridges, the ladies wanting to add PEP to the meetings decided to draw names for secret pals. This created quite an interest, extending through August, when secret pals were revealed at our party, with Mrs. Weidlein as hostess. This proving so interesting we decided to repeat again.

The ladies entertained the men at the Fair grounds with a basket picnic, which was enjoyed by all. After eating, the men entertained the ladies with rides on the different concessions. Mrs. Bridges, Mrs. Turner and Mrs. Bill Thompson, who are the heavyweights of the Auxiliary, took it upon themselves to test out the children's slides. After the first attempt the sides of the slides had to be replaced by the Park Commission, since the "container" was much smaller than the "contents."

We had a watermelon feast in the form of a surprise party at the Bill Easleys' home, due to the fact that they were leaving for New Orleans. As a token for their loyalty to the Memphis Chapter they were each presented a parting gift.

USE THE ZENITH REFRIGERANT FILTER

. . . FOR SULPHUR DIOXIDE, FREON OR METHYL CHLORIDE REFRIGERATORS

BECAUSE Zenith elements provide finer spacings (.002") than any asbestos sack or wire screen filter.

Easily installed—Easily cleaned
Permanent Protection
No Wool or Asbestos to Rot and Wear Out
Corrosion Proof—Leak Proof
Ample Capacity

Positive protection against dirt in Expansion Valves, Solenoid Valves, Capillary Tubes and other liquid control devices.

ZENITH CARBURETOR COMPANY
Subsidiary Bendix Aviation Corp.
DETROIT, MICHIGAN

Engineered Refrigerant Filters in a variety of sizes for varying capacities.

Mr. and Mrs. Carl Brakefield have the honor of being the proud parents of the first R. S. E. S. baby boy, who we hope will NOT be a gas eater like his father.

Enthusiasm is running at fever heat in Memphis as the convention draws nearer. We are hoping to see many familiar faces that will be pleasantly remembered from the last convention. Good luck to you, Chicago! We are for you.

COLUMBUS CHAPTER

Meeting of September 28, 1937

By R. E. YEAGER, *Secretary*
1538 N. High St., Columbus, Ohio

THE chapter got away to a good start on this season's educational program by having Mr. Plumer, manager, Electric Motor Service of the United Motors, speak to the chapter on the night of Tuesday, September 28th. Mr. Plumer's vast knowledge of electric motors of all makes, and their applications and service problems was easily recognized after his explanations.

Columbus Chapter was glad to have Mr. Plumer for their first speaker of the season, and we hope we shall be able to obtain for future meetings speakers who have a knowledge as thorough as is Mr. Plumer's on electric motors.

The regular business meeting of the chapter followed, with the collection of dues and approval of membership applications.

YOUNGSTOWN CHAPTER

Meeting of September 27, 1937

By M. W. BOKESCH, JR., *Secretary*
2328 Mahoning Ave., Youngstown, Ohio

PRESIDENT MARTIN BOKESCH, SR., called this meeting to order, after which followed roll call, minutes of the last meeting and the treasurer's report.

Next followed a discussion on the procuring of new members for the chapter, and the next meeting is to be devoted to explaining to prospective members the advantages offered by the R. S. E. S. Secretary Bokesch is to address letters to all prospects and Mr. Chas. P. Eich is to be the principal speaker at the meeting, which is to be held on October 11th. Each visitor will be presented with a copy of the official organ—THE REFRIGERATION SERVICE ENGINEER—and door prizes and souvenirs will be given at the meeting.

A Famous Wrench Backed by a Famous Guarantee

In July 1923, Bonney startled the tool world by announcing a new kind of wrench "guaranteed to strip the thread or break the bolt without damage to the wrench." It was the Bonney 'CV' Chrome-Vanadium Engineers' Wrench.

Today—14 years later—hundreds of other tools including a full line of tools for Refrigeration Service work are made of 'CV' Chrome-Vanadium Steel and carry the same guarantee as the original wrench.

BONNEY FORGE & TOOL WORKS, Allentown, Pa.
Stocked by leading jobbers everywhere.

Catalog No. 137 shows the full line of Bonney Tools. Write for your copy.

MAIL THIS COUPON TODAY →

I'm interested in refrigeration tools. Please send copy of No. 137 Catalog.

Name.....

St. & No.....

City & State.....

Mr. Martin Bokesch, Sr., was unanimously elected as delegate to represent Youngstown Chapter at the convention in Chicago, with Mr. Gene Kreitzburg as alternate delegate. A motion was carried to give the delegate $35.00 and the alternate $25.00 toward expenses for attending the convention.

A meeting of the Ohio State Association is to be held at the Neil House in Columbus, Ohio, for the purpose of electing temporary officers and to work out a system of continuing the State Association, Secretary Bokesch to address the Secretaries of the various Ohio chapters reminding them of the meeting date and place.

MISSISSIPPI VALLEY CHAPTER

Meeting of September 10, 1937

By E. L. BENGSTON, *Secretary*
116 E. First St., Davenport, Iowa

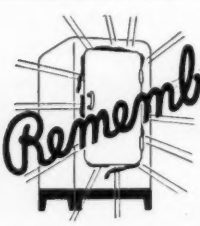
DUE to the absence of the President, the Vice President, Mr. Leonard Nelson, opened the meeting and introduced the speaker of the evening, Mr. S. Ellison, a representative of the Perfection Refrigeration Parts Company of Harvey, Illinois. He gave a very interesting talk on compressor parts and the usual discussion followed.

Following the educational talk by Mr. Ellison the business session of the chapter was opened. Quite a discussion took place with regard to the Fourth Annual Convention to be held in Chicago on November 3rd, 4th and 5th.

The motion was made by Mr. Dick and seconded by Mr. E. J. Ford that the next meeting be held when Mr. Goldberg, chairman of the National Convention Committee, could come to Davenport to give us more information regarding the National Convention.

It was also decided that each member is to be assessed 25c for his failure to be at the next regular meeting without a good excuse.

Refreshments are to be served after the next meeting, one-half of the expenses to be paid by the Society and one-half of the expenses to be paid by the Republic Co.



DOOR GASKETS WEAR OUT, TOO

Few refrigerator parts are subjected to such hard and continuous wear as door gaskets. Nor are there many parts more vital to safe and economical operation. Thousands of doors are in need of gasket replacements. Here is an opportunity to offer a service that is both in demand and highly profitable.

Miller makes it easy for you to get this business. Their simplified line of 20 gasket types enables you to meet 80% of all replacement needs. Years of specialized experience in this field assure you a product of proper design and highest quality.

Be prepared. Send for illustrated price list. If not obtainable through your local jobber, write direct.

THE MILLER RUBBER COMPANY, INC. **Akron, Ohio**

CHICAGO CHAPTER

Meeting of September 14, 1937

By WILLIS STAFFORD, *Secretary*
726 Hinman St., Aurora, Ill.

AFTER the minutes of the last meeting had been approved, the meeting was turned over to Mr. Herman Goldberg who reported in detail on the convention plans for the ladies who were visiting at the meeting.

Mr. Goldberg outlined the committees which are working on the General Convention Committee.

Chicago Chapter is leaving no stone unturned in putting over the Society's biggest convention.

In outlining the ladies' part in the convention, Mr. Goldberg stated that the ladies should make every effort to welcome the visitors and have them feel like they are at home. He suggest that each lady be given some token as a souvenir.

Mr. Goldberg warned that the convention is only six weeks away. All convention plans should be outlined in detail at least two weeks before the opening.

Mr. Goldberg next asked for men to volunteer to the various committee heads.

The primary reason for the convention is for educational purposes. This part of the program will be designed to be the most interesting possible. The other reasons for the meeting are entertainment and financial. The entertainment has already been outlined in previous reports.

The business sessions of the convention will be from ten in the morning until one in the afternoon, or a little later.

Motion was made and carried that the convention program be approved in its present stage.

Refreshments were served before adjournment.

PITTSBURGH CHAPTER

Meeting of September 13, 1937

By F. V. GOLITZ, *Secretary*
1109 Pemberton St., Pittsburgh, Pa.

THE regular meeting of Pittsburgh Chapter was held in the Commonwealth Building on Monday, September 13, 1937, with Mr. Kirch presiding. Attendance forty members and visitors.

Mr. Kirch read the correspondence. The members commented on the coming convention and membership drive. From a poll of the members present about 12 members from the Pittsburgh Chapter are planning to attend the convention.

KOLD-HOLD
ICE CREAM CABINET CONVERSION UNITS

Have Proven Highly Successful

Hundreds of these units have been functioning daily all summer long with exceedingly fine results. Inexpensive, easy to install, they offer the ideal means of modernizing old cabinets.

Note these outstanding features:

- Quickly adjustable to all standard size cabinets.
- Provide greatly increased storage space for packaged goods.
- Eliminate brine leaks and attendant odors.
- All steel construction — rustproof finish.
- Uses present controls.
- Provide ideal temperatures under all conditions.
- Cost less to operate.

See them at the convention or write for complete details.

KOLD-HOLD
TRUCK REFRIGERATION

MOST ECONOMICAL—MOST DEPENDABLE — MOST POPULAR — AVOID SUBSTITUTES.

KOLD-HOLD MFG. CO.
LANSING, MICHIGAN

It was moved by Mr. Barbagallo and seconded by Mr. Ross that the nomination for delegate and alternate be held and the election be held on the next meeting night. Motion carried. The following members were then nominated—N. D. Wagener and E. V. Black. On motion of G. Croston and seconded by C. A. Claus, the nomination was closed.

A discussion of a change of meeting nights was held and it was moved by Mr. Waight and seconded by Mr. Black that the meeting night be changed from the second Monday to the second Friday for a trial period. Motion carried.

Mr. Kirch appointed E. V. Black as Chairman of the Educational Committee with instructions to arrange for a member to discuss a service problem at the next meeting.

Mr. Kirch introduced Mr. Walter J. Gilbert, the educational speaker for the evening. Mr. Gilbert reviewed the history of compressor seals and demonstrated the Syntron seal. Mr. Gilbert's lecture was illustrated by a well made set of charts and, of course, his inimitable stories and gestures met with the approval of the members. Of particular interest to the members was the account of his experiences with the Isko refrigeration unit and the Austin car he drove.

In all, this was one of the best lectures from the standpoint of information about a new product and as entertainment that we have had in the Pittsburgh Chapter. Mr. Kirch and the members gave Mr. Gilbert a round of applause and their thanks for a fine presentation.

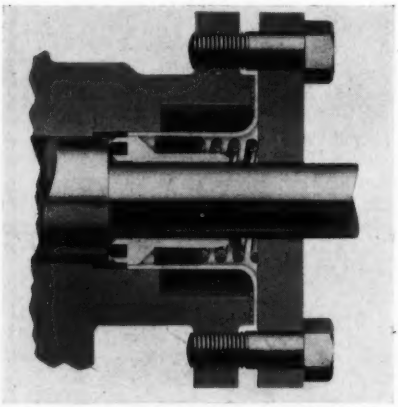
TRI-COUNTY CHAPTER

Meeting of September 17, 1937

By **B. V. CLARK,** *Secretary,*
612 N. May St., Aurora, Ill.

THIS meeting was held at the Woodruff Hotel in Joliet, and was called to order by temporary chairman Willis Stafford.

After some discussion it was decided to elect permanent officers for the balance of this year. The following results were obtained: Mr. Harvey Burgess, *President;* Kenneth Pentz, *Vice-President;* B. V. Clark, *Secretary;* Wm. Metcalf, *Treasurer;* Clark Feeney, *Sergeant-at-Arms;* Al. Davis, Eugene White and Paul Seifrid, *board of directors.*



A Frictionless Face Seals Against the Shaft Collar

⅜ Inch No. 20 Seal $3.85, less generous discounts. Fits Refrigerator Compressors with ⅜" Shafts

THE NEW

SYNTRON

SHAFT SEALS

Stop Leaking Shafts

for Once and for All

Life tests in actual service have proven their ability to effectively seal worn and scored shafts, as well as new shafts, against vacuum and up to 300 lb. pressures.

SELF SEATING—SELF CENTERING—SELF LUBRICATING

Order from your Jobber or Direct from Us

SYNTRON CO., THOMAS BLVD., HOMER CITY, PA.

Mr. Burgess, in assuming the office of president, asked the cooperation of all of the members in making the chapter a success.

A sample constitution, such as has been adopted by other chapters, was read by Mr. Stafford.

In Article VII, Section 1, of the Constitution, it was decided to eliminate the second vice-president for the present time. In Article VII, Section 2, of the By-Laws, a motion was made and carried that the meetings of the chapter be held on the first and third Mondays of each month.

A motion to adopt the sample constitution with the above corrections was carried. It was suggested that the Secretary mail a copy of the adopted constitution to each of the members.

Motion was carried that the Secretary mail a list of the members to every member, along with elected officers and important happenings at this meeting.

* * *

R. L. HENDRICKSON MOVES TO OMAHA

OFFICIALLY resigning his post as Chairman of the Educational Committee for the Chicago Chapter of the Refrigeration Service Engineers Society, Mr. R. L. Hendrickson is going to make his permanent residence in Omaha, Nebraska, where he will operate his own business.

Mr. Hendrickson sees a good future in the business of Air Conditioning and Refrigeration contracting work in and around Omaha. He also is going to be in a position to do Consulting Engineering work for dealers and others who need a technical advisor on refrigeration, air conditioning, or heating problems.

Experience with the Utilities Engineering Institute as chief engineer for the past four years together with many years of actual work in refrigeration has given him a comprehensive background from which to draw, in advising others on problems which arise from time to time.

Mr. Hendrickson started in refrigeration with Servel on the Pacific Coast in 1924. In 1929 he moved to Berkeley and attended the University of California for the purpose of getting further technical knowledge on Heating — Ventilating — Thermodynamics, and other subjects related to refrigeration and air conditioning. During this time he worked for W. E. Magoon, one of the oldest independent refrigeration service men in the United States.

Gilmer "V"'S

are NEVER SKIMPED

GET Gilmers because Gilmers are *full size, full width, full thickness.* A Gilmer V-Belt runs in the groove *right* . . . a Gilmer cannot turn over! "Tailor-made in the grooves," on the world's largest assortment of V-moulds, by belt engineers who build only belts.

FREE 120-page Gilmer V-Belt Catalog. Send NOW for yours.

L. H. GILMER CO., Tacony, Philadelphia

The Oldest Firm of Rubber Fabric Belt Specialists

Madison (Wisconsin) Applies for R.S.E.S. Chapter

September 27, 1937, at the Park Hotel

By **AL. J. MEINKE,** *Temporary Secretary*
1639 Monroe St., Madison, Wisconsin

A DINNER preceded the meeting held at the Park Hotel, Madison, Wisc., September 27, which was attended by forty some refrigeration service engineers from the territory surrounding Madison. This repast was furnished through the courtesy of the Cutler-Hammer Company and the Chase Brass & Copper Company. The meeting was arranged by Mr. Gustave A. Larson, refrigeration jobber. Many men made special efforts and traveled long distances in order to attend the meeting. The attendance of Mr. G. D. Wang from Milwaukee, and a contingent of R. S. E. S. men from Rockford were striking examples of this.

After the meal, the meeting retired to the Wisconsin Room and Mr. Gus Larson introduced one of Madison's star performers, Attorney Carl Flom, who succeeded in keeping the engineers guessing as to where the cards came from. Mr. Larson then introduced Mr. C. Buschkopf of Beaver Dam, Wisconsin, who is one of the national directors of the Society, who told of the successful efforts to provide a meeting in Madison with the thought of forming a Madison local chapter. After a short interesting talk, Mr. Buschkopf introduced Mr. H. T. McDermott, national secretary, who explained how the Society happened to be organized, its purposes and its policy toward protecting the public, and the proper procedure for the formation of a local chapter. Mr. Wang helped a great deal with his talk on why and wherefore and the methods of procedure for organization.

Elections of temporary officers followed. Mr. Herbert Struthers of Madison was elected temporary chairman; Al J. Meinke of Madison, temporary secretary, and Ray Sweeney, temporary treasurer.

A total of twenty applications were signed requesting membership in the Society.

Mr. Gus Larson proved his generosity by donating several tools as door prizes. These were awarded as follows: first prize — Ed Berg, Fond du Lac—a flaring tool; second prize—Ray Hoffman, Fort Atkinson—a tubing cutting tool; third prize—Al Meinke,

GUARANTEE PROFITS WITH GENUINE KELVINATOR PARTS

THERE IS ONLY ONE WAY TO BE SURE!

Insist that your replacement parts be:

Built from the dra[redacted]used for the manufacture of the original equipment.

Built with the s[redacted]e machinery as used in the manufacture of the original equipment.

Tested with the same precision testing equipment as used in regular production.

Improved in materials and methods as developed by one of the industry's most extensive research laboratories.

ONLY KELVINATOR CAN BUILD SUCH KELVINATOR REPLACEMENT PARTS

KELVINATOR USERS DESERVE GENUINE KELVINATOR PARTS

Madison—a testing thermometer; fourth prize—Harvey Strcich—a thermometer.

Manufacturers cooperated and very kindly sent capable men to give us interesting talks and displays. From the Cutler-Hammer Company, Inc., were Mr. K. H. Archie and R. O. Perrine. These gentlemen gave us a very capable presentation of refrigeration controls and overload devices. The Chase Brass & Copper Company of Milwaukee were represented by E. C. Eickhoff and Douglas M. Irwin who presented the "Why, Wherefore, Whereof, etc., of Sweating Copper Tubing Fittings." Their talk was very interesting.

The treasury did a rushing business collecting fees from the various new members.

Chairman Struthers announced the next meeting would be held October 12th.

S S S

ADVERTISING AND MORE MONEY

By **W. H. MOSS, First Vice-president**

THE refrigeration service man, like everyone else, is interested in "More Money" and it is with much pride that I can call his attention to the satisfying results towards this goal that can be accomplished through membership in the R. S. E. S. and by attending their National Conventions—especially the 1937 Convention in Chicago, Nov. 3, 4, and 5.

You cannot sell the public on the idea that the qualified members of the refrigeration service field are entitled to more money for their services, unless you can tell them a story as to why the qualified members are entitled to more for their efforts.

The way to inform the public of your qualifications is through various forms of advertising. And the way to get the most out of your advertising is to be a member of the R. S. E. S. and attend its National Conventions.

There are several very effective ways for local chapters to place before the public the advantages of giving its service work to the R. S. E. S. members and I outline a few below.

RADIO BROADCASTING: Where money is plentiful service organizations may buy radio announcements calling attention to their organization, or the local chapter can have co-operative announcements made naming their members.

Drivers for Every Job!

• Long handles to reach way in. Short handles for close quarters. Flashlight screw driver for work in the dark. Tackle anything with this wide selection of handle lengths and blades. No other tool kit equipment so quickly pays for itself in time saved as the right screw driver at the right time.

Snap-on builds and stocks a complete line of hand tools, over 1700 described and illustrated in the 1937 catalog. To call a Snap-on service salesman, phone the nearest Snap-on branch distributing warehouse, or mail coupon for FREE Snap-on—Blue-Point catalog.

Snap-on Tools Corporation
Kenosha, Wis.

SNAP-ON TOOLS
Kenosha, Wis.

☐ Send FREE catalog
☐ Show me .....
NAME .....
ADDRESS .....
..... RSE 10

Snap-on

SPECIALIZED TOOLS FOR REFRIGERATION SERVICE

POWER COMPANY: The local power company is always interested in building up their current load and any aggressive local chapter can get good assistance from the power company because an idle refrigerating unit does not use current and a dissatisfied customer will prevent the sale of new equipment.

NEWSPAPERS: Are a very good medium for advertising. If properly handled they will give a lot of free publicity to the members using their columns and to the local chapter, presenting the higher qualifications of its members and calling the prospective customers' attention to the members.

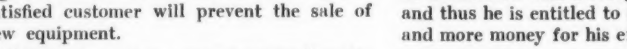
TELEPHONE DIRECTORIES: Offer a splendid means of calling the public attention to R. S. E. S. members. The R. S. E. S. emblem can be used, listing all the members and their telephones.

FAIRS AND EXPOSITIONS: Local chapters can make use of booths at fairs, displaying repaired equipment or actually doing the repair work on equipment—showing the public what it really takes to do service work.

CIRCULARS, CARDS, ETC. There are, of course, the various forms of posters, folders, circulars, stickers, cards, etc., to use for distributing and mailing. The greatest benefit is derived from the use of such forms when used with the R. S. E. S. emblem on them—it places the user in a position to show that he is affiliated with a recognized organization and thus he is entitled to more consideration and more money for his efforts.

WORD OF MOUTH: This is the hardest form of advertising through which to get the proper results and can only be learned through experience or the attendance of meetings where discussions of the subject may arise, such as the National Convention.

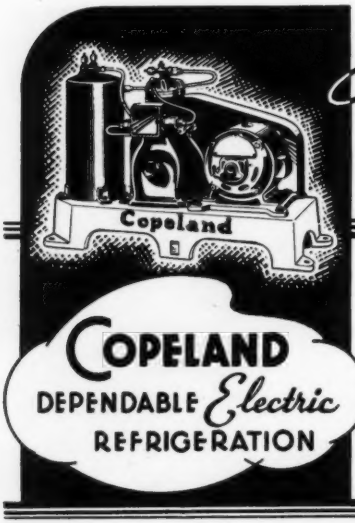
You are being expected. Don't disappoint us. Be there SURE.



BALANCING COOLING COIL AND CONDENSING UNIT

(Continued from Page 28)

These capacities and evaporation temperatures are based upon inlet water conditions of 80 degrees and 50 percent air and 75 degrees cooling water available for the



A PRECISION-BUILT UNIT for EVERY Household and Commercial Application!

● COPELAND Units are precision-built according to the highest standards prevailing in the industry. Cylinder walls are micro-honed to mirror smoothness; bearings are diamond-bored; crankshafts and flywheels perfectly balanced. The result is remarkable, smoothness—remarkable economy—exceptionally long life. Your customers want Copeland performance and quality. Literature on request.

Quick Service on Genuine Copeland Parts

Copeland Refrigeration Corporation

Holden Avenue at Lincoln
DETROIT

machine. In general, I believe the coil should be selected so as to give a 40 degrees evaporation temperature when we have 80 degrees and 50 percent relative humidity air and then, if conditions of the air vary, our evaporation temperature is unlikely to go below 35 degrees which involves no danger of frosting the coil nor above 45 degrees above which temperature we may not get a sufficient degree of dehumidification.

I would say that in any case the evaporation temperatures should be kept between 30 degrees and 50 degrees with the preferable range between 35 degrees and 45 degrees.

OVERCOIL THAN UNDERCOIL

If the condensing unit capacity cannot be obtained for the exact amount of refrigeration required, we can increase or decrease the capacity of the machine somewhat by over-coiling or under-coiling the machine.

In general, I believe it will be found more advisable to over-coil than to under-coil as the difficulties involved due to frosting the coils are greater than those which may occur due to insufficient dehumidification. Also we may decrease the capacity of a coil that is oversize by adjusting our thermostatic expansion valves for a greater degree of superheat, whereas if the coils are undersized, there is nothing we can do to help conditions along except possibly to decrease our condensing unit capacity by throttling our suction line by some throttling valve which, of course, decreases the operating efficiency of our system.

* * *

HARRY ALTER WEST SIDE BRANCH IN NEW LOCATION

MR. IRVING ALTER, of The Harry Alter Co., announces the removal of their West Side branch store in Chicago to 5225 W. Madison St. This branch is under the management of Joe Holub, an active member of the R.S.E.S., who has been in charge of their West Side branch for the past two years.

The new location incorporates many new features and is laid out to permit the handling of sales promptly and efficiently. With his increased stock, Mr. Holub will be able to handle orders much more efficiently than in the past.

"DIDN'T KNOW IT WAS LOADED"?
Take NO chances with fumes!

HEALTH GUARD FUME KIT

There are no "mild" concentrations of refrigerants. Where there is a leak there should be a mask. This kit is designed especially for use of refrigeration servicemen. Light, compact, easy to carry. On or off with one move. Filtering cartridges for ammonia, methyl chloride and sulphur dioxide. The mask is the most comfortable to be had—and forms a perfect seal. Write for details and prices.

a CESCO Safety Product

CHICAGO EYE SHIELD CO.
2341 Warren Blvd. CHICAGO

KRAMER
COIL PRODUCTS
—A Complete Line
Send for Catalog
TRENTON AUTO RADIATOR WORKS
TRENTON, N. J.
Kramer Auto Radiator Corp. New York, N. Y.
Kramer Auto Radiator Co. Pittsburgh, Pa.

THE LARGEST STOCK OF
REFRIGERATION SUPPLIES
IN CANADA
RAILWAY & ENGINEERING
SPECIALTIES LIMITED
TORONTO MONTREAL WINNIPEG

Don't Wish for Success
TRAIN FOR IT
U.E.I. training in Electric Refrigeration provides just the knowledge you need. It is interesting, thorough, practical, authentic. You study at your convenience in the privacy of your home.
Place yourself head and shoulders above rule of thumb mechanics. Be a technically trained Refrigeration Technician.
Interesting and valuable facts FREE for the asking. Write today.
UTILITIES ENGINEERING INSTITUTE
404 N. Wells St. Chicago
17 W. 60th St. New York, N. Y.

REFRIGERATION SUPPLIES DISTRIBUTOR
"nuf sed!"
Los Angeles, Calif.
222 North Vermont
Phoenix, Ariz. — Long Beach, Calif.

M. PARCARO MADE MANAGER OF PENN'S NEW YORK OFFICE

R. H. LUSCOMBE, sales manager, Penn Electric Switch Co., Goshen, Ind., has announced the appointment of M. Parcaro as manager of Penn's New York office, effective August 15.

M. PARCARO

Mr. Parcaro was connected with Carrier Engineering Corporation, Newark, New Jersey, for 13 years prior to joining Penn Electric. In that connection he was engaged in design and research work and had served for a number of years as control engineer for the Carrier organization. He was active in the design of standard and special control systems for Carrier.

PAUL SHAPIRO APPOINTED MANAGER OF SOUTH BEND BRANCH OF LANGSENKAMP

IN keeping with its policy of increased service to its customers, Mr. F. Langsenkamp, Jr., announces the appointment of Paul Shapiro as manager of the South Bend, Ind., branch office of the F. H. Langsenkamp Co., of Indianapolis, Ind.

CANADIAN MARKET
Is yours if you contact our
H. M. MILNE at STEVENS HOTEL
who is at the convention to deal with you Refrigeration Parts Manufacturers.
• **MODERN HOUSEHOLD APPLIANCES LIMITED**
MONTREAL • CANADA

Mr. Shapiro's past training and experience fits him very well to render a better service to this territory.

S S S

PARKER TO BE REMPE SOUTHERN REPRESENTATIVE

REMPE COMPANY of Chicago, manufacturers of coils for refrigeration and air conditioning, have just announced the appointment of Mr. Joe E. Parker as Southern Representative.

Mr. Parker, who is located at 115 King's Highway, Decatur, Georgia, has spent the last several years in the refrigeration field, having been connected with the Larkin Company of Atlanta and Chicago for several years, and recently with Refrigeration Appliances, Inc., of Chicago.

Mr. Parker is to represent the Rempe Company in the states of Virginia, North Carolina, South Carolina, Tennessee, Alabama, Georgia, Mississippi and Florida.

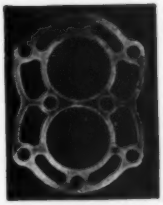
S S S

PENN ELECTRIC RAPIDLY COMPLETING MOVE TO NEW FACTORY

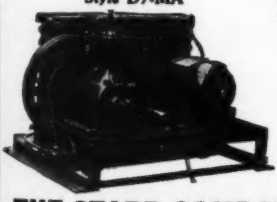
PENN ELECTRIC SWITCH CO. has just announced that entire production facilities for manufacturing oil burner, stoker, gas heating, refrigeration and air conditioning controls are now located in the company's new factory at Goshen, Indiana.

Penn Electric early in July announced the move of all executive offices, all research and development activities and a portion of its manufacturing to the new location. Pump and air compressor controls will continue to be manufactured at the company's factory in Des Moines, Iowa, until early next year, according to M. E. Henning, ex-

General Electric, Westinghouse, Majestic, Gibson-Hermetic Units
Rebuilt or Repaired
Complete MACHINE SHOP SERVICE on all makes of both domestic and commercial units. All units completely tested and guaranteed. Write for our latest price list.
ALLIED REFRIGERATION PRODUCTS CO.
1947 Flushing Avenue Brooklyn, New York

REPLACEMENT GASKETS FOR ALL MAKES

Metallic Gaskets that hold regardless of what the refrigerant may be and will not shed particles of material to clog up important working parts in a machine.
Send for catalog listing many "orphans" not available elsewhere.
CHICAGO-WILCOX MFG. CO.
7701 S. AVALON AVE., CHICAGO, ILL.

● Every month we tell you about another replacement gasket. Watch this space regularly. JARROW gaskets are made to the manufacturers' specifications. *Insist on Jarrow gaskets for replacement.*
JARROW PRODUCTS CORPORATION
420 N. LaSalle St., Chicago, Ill.

Condensing Unit Style D7-MA

STARR FREEZE
DEPENDABLE COMPRESSORS AND CONDENSING UNITS
1-2-4 Cylinders—⅛ to 10 H.P.
The most profitable and complete line to select from—just the size to build that refrigerator,—to assemble that condensing unit or to replace that old worn-out compressor.

Compressor Style J
THE STARR COMPANY, Richmond, Ind., U. S. A.
222 N. Vermont Ave. Los Angeles, Calif.
2025—1st Ave. North Birmingham, Ala.
1222 Huron Road Cleveland, Ohio

ecutive vice-president of Penn Electric Switch Co.

The new factory site, selected after a careful study of a number of possible locations by Penn executives, is expected to save the company a substantial amount in freight on raw materials alone. This does not take into account the transportation savings to customers, many of whom are located within 150 miles of Goshen, in cities readily accessible by motor truck as well as rail. They include the country's largest manufacturers of heating, refrigeration and air conditioning equipment, pumps and air compressors for whom the Penn Electric Switch Co. has developed a variety of controls.

The new plant development includes a two-story office building, 42x118 ft. with penthouse recreation room, and a one-story, monitor type factory building 210x340 ft. enclosed by continuous sash, insuring daylight throughout the working area.

Heating and power distribution installations are naturally of the most up-to-date types. Forced hot water for factory heating and steam for offices are furnished from

"DOWN SOUTH"

THEY RELY ON—

ENOCHS SALES COMPANY

FOR REFRIGERATION SUPPLIES

Complete Stocks in Two Cities

805 Howard Ave. NEW ORLEANS, LA.

128 S. President St. JACKSON, MISS.

SEND FOR NEW CATALOG

IF

you really want to learn

AIR CONDITIONING

you can by attending the lectures, studying the lesson material and making actual installations and tests at

DETROIT SCHOOL OF REFRIGERATION and AIR CONDITIONING

4125 Grand River Detroit, Michigan

Write for details.

SERVING THE SOUTHWEST SINCE 1929

Backed by experience of more than 20 years in the refrigeration industry

WHOLESALE JOBBERS
For every refrigeration and air conditioning need

SOLE TERRITORIAL DISTRIBUTORS
For many items requiring the knowledge and experience to make engineering recommendations

LARGE & COMPLETE STOCKS—QUICK SHIPMENTS

Snappy and Intelligent Service from Thoroughly Trained Personnel

If you don't have our New 230 Page Catalog and reside in our trade territory—we'll gladly send it

FORSLUND

Pump & Machinery Company

"Members of and Boosters for R. S. E. S."

1721 Main St. Kansas City, Mo.

MAJESTIC Replacement Units

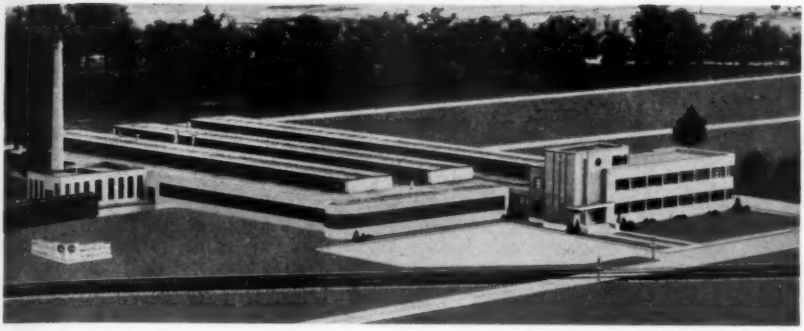
Visit our booth No. 64 at the R. S. E. S. Convention, Stevens Hotel, Chicago, Nov. 3-4-5.

• The only original and genuine Majestic service in the world • Complete stock parts for every model prior to 1936 • Our rebuilt units are guaranteed for 18 months • Dealers wanted everywhere • Write for literature.

LOCATED AT THE SAME ORIGINAL MAJESTIC FACTORY

G & G Genuine Majestic Refrigerator & Radio Parts Service

Factory & General Offices—5801 Dickens Ave., Chicago



NEW PLANT OF PENN ELECTRIC SWITCH CO., AT GOSHEN, IND.

automatically fired boilers housed in a 58x40 ft. building. Heating and cooling units have been installed throughout the factory area, and water used for summer cooling is pumped to the roof where spray nozzles maintain a shower over the roof deck during the day to keep inside temperatures as low as possible. All power circuits for manufacturing operations are taken off enclosed conduit containing both 110 and 220 volt supply lines.

FOR YOUR CONVENIENCE

The following mid-western jobbers carry a complete selection of all the parts, tools, and supplies necessary to the service man:

United Supply Company, 207 N. 16th Street, Omaha, Nebraska.

Nat'l Refn. Service 510 Water St. Sioux City, Iowa.

Refr. Supply Company, 359 Wesley Way, Sioux City, Iowa.

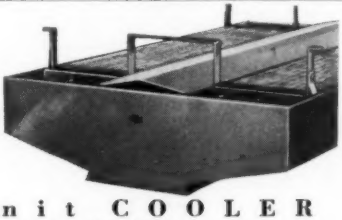
Globe Machy. & Supply Co., 205-211 W. Court Avenue, Des Moines, Iowa.

Winterbottom Supply Co., Commercial & Miles, Waterloo, Iowa.

Republic Electric Co. 114-118 E. First Street, Davenport, Iowa.

Members of Midwest Refrigeration Supply Jobbers Credit Association.

Why is correct circulation so important in a Walk-In Cooler? Write for new descriptive folder on the self-circulating



AUTODRAFT Unit COOLER

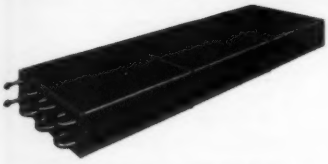
Gives facts every refrigerator man should have.

For 43 years, makers of refrigeration and air conditioning coils.

REMPE CO. 340 N. Sacramento Blvd. CHICAGO

MANUFACTURERS FIN COIL CO.

2505-7 SO. PULASKI ROAD CHICAGO, ILL.



WRITE FOR CATALOG

FIN COILS
STEEL—ALUMINUM—COPPER
BARE TUBE COILS
STEEL—COPPER
BLOWER UNITS
AIR-CONDITIONING COILS
HEATING AND COOLING

AIRO SUPPLY ANNOUNCES WINNER OF CONTEST

IN the September issue of THE REFRIGERATION SERVICE ENGINEER, Airo Supply Co., 2726 N. Ashland Ave., Chicago, made an announcement of the World Series Baseball Contest, which they were conducting for the purpose of securing new customers.

The contest closed on Tuesday, September 28, 1937. Mr. Charles Knox, of South Haven, Mich., was selected as the winner. The committee of judges making this selection were: Mr. Arch Ward, nationally-known sports editor of the Chicago Daily Tribune; Mr. E. A. Vallee, vice-president of the Automatic Products Co., Milwaukee, Wis.; and Mr. I. H. Malin, business manager of the Southeast National Bank of Chicago.

Airo Supply Co. states that the contest created considerable interest in the trade as a whole, and the replies received were very well written, showing considerable thought and interest.

HERMAN GOLDBERG CO.

Manufacturers' Agent

Meet me face to face at
Booth No. 22—R. S. E. S. Convention

STANDARD REFRIGERATION CO.
Evaporators—Condensers

ANSUL CHEMICAL CO.
Sulphur Dioxide—Methyl Chloride

AMERICAN INJECTOR CO.
Valves

RANCO
Controls

9 S. CLINTON ST., CHICAGO

JAMES T. CASTLE

Pressure, Temperature and Time Controls for Refrigeration Air Conditioning Beer and Water Pumps

424 First Ave. Pittsburgh, Pa.

UTILITIES ENGINEERING INSTITUTE ADDS TO STAFF

Refrigeration and Air Conditioning School Expands

IN its current expansion program, Utilities Engineering Institute of this city has augmented its staff by the addition of W. H. Hoehne, formerly Pacific Coast Manager for the McCall Corporation, Walter W. Voss, engineer, formerly employed by Minneapolis-Honeywell Regulator Company, and P. B. Ford, formerly with the Welsbach Company and Greer College.

Mr. Hoehne fills the post of Vice-President in charge of sales, after twenty-five years of intensive executive-sales experience, most of which has been with the McCall Corporation, prominent publishing firm.

Mr. Voss augments the instruction staff of the Institute. He received his engineering training at Chicago University and Armour Institute. His several years of experience in the refrigeration and air conditioning industry have been gained while in the employ of R. Cooper, Jr., Inc., distributors of General Electric products, and for the past few years as engineer in the Chicago office of Minneapolis-Honeywell Regulator Company. His varied experiences in the application of controls to refrigeration and air conditioning systems of many types should prove to be a valuable addition to the Chicago school's staff.

General Electric—Gibson—Sunbeam—Westinghouse—Servel—and U. S. Hermetic units rebuilt with one year unconditional guarantee.

Complete stock of Refrigeration Parts —Tools—and Supplies

Write for Catalog

We sell to service men only

REFRIGERATION PRODUCTS, Inc.
122 W. Illinois St., CHICAGO, ILL.

Mr. P. B. Ford has, for the past five years, been employed as chief refrigeration instructor at Greer College. Prior to that connection, Mr. Ford was employed in various capacities by the Welsbach Company, the last of which was the training of service men on the Welsbach ethyl chloride refrigerator manufactured by that company for several years.

Increased interest in the training conducted by Utilities Engineering Institute has made a larger staff necessary.

* * *

HERE is Ray Polley (right), sales manager of Mills Novelty Company's Compressor Division, telling how the entire seal assembly of the Mills Compressor can be removed and replaced without taking the whole compressor apart. The other two fellows looking at the cut-a-way compressor are Bill Ryan (left) of the department and Forrest Jernberg, crack Mills Field Sales Engineer.

VISIT THE G. & G. BOOTH AT THE CONVENTION

ONE of the most interesting exhibits at the forthcoming convention of the Refrigeration Service Engineers' Society, at the Stevens Hotel, Chicago, will be that of the G. & G. Genuine Majestic Refrigerator and Radio Parts Service Co. The booth of this firm will be in charge of Mr. John Kuncl, chief engineer in their Refrigeration Department, who was formerly connected

WELCOME to the Convention

• On your way back home stop in at one of our complete refrigeration warehouses. While there, ask for our new catalogue on refrigeration supplies which is just off the press. Complete stocks of domestic, commercial, and air-conditioning supplies. Latest wholesale prices, instantaneous service with competent refrigeration engineers to assist you with your technical problems.

See the Langsenkamp Display Coach at booth No. 69

"Our stock today is on your job tomorrow."

F. H. LANGSENKAMP COMPANY

229-237 E. South St.
Indianapolis, Indiana
127 S. St. Joseph St.
South Bend, Indiana

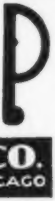
Attention Service Men

Do you have an extra or spare Frigidaire compressor body? Can supply the following models at once. These may be had either reoperated or as is. Models Twin. S. G. K. O. L. Y. N. C. Also sump tanks for all models. Can supply a limited amount of motors 110, 220, 60 Cycle from ¼ H.P. to a 1 H.P. Prices on request. Also complete units.

Refrigeration Surplus Jobbers
5622 Woodland Ave., CLEVELAND, OHIO

DENNIS GASKETS
FOR ALL MAKES REFRIGERATOR DOORS

A complete line of rubber - coated, packed Gaskets and extruded rubber Gaskets that last longer —retain higher efficiency—because made of finest materials and workmanship. Write for free samples, giving your jobber's name and address.



W. J. DENNIS & CO.
2110-20 WEST LAKE ST. ··· CHICAGO

with the old Grigsby-Grunow Co., ever since its inception. Mr. Al Gatz, who has charge of the Refrigeration Parts Department of the G. & G. Company, will also be at their booth. Mr. Kuncl will demonstrate to the servicemen the breaking down and rebuilding of Majestic hermetic compressors, and will also be pleased to answer any questions that the servicemen may care to ask.

A year ago, the G. & G. Company purchased the original direct factory of the Grigsby-Grunow Majestic Refrigerator and Radio Parts Service, consisting of a one-half million dollar stock of parts, and 2,000 Majestic replacement units.

The firm will be pleased to send literature and price list to interested servicemen, dealers and distributors upon writing the factory direct at 5801 Dickens Ave., Chicago.

GENUINE PARTS INSURE SATISFIED CUSTOMERS

Use genuine Universal Cooler Parts, made by the manufacturer of Universal Cooler equipment from the original drawings and blue prints.

Only by using genuine Universal Cooler parts can you take advantage of new developments and improvements as they are released by the manufacturer and thus protect customer good will and profits.

UNIVERSAL COOLER CORPORATION
DETROIT, MICHIGAN

MODERN HOUSEHOLD APPLIANCES LTD. LOOKING FOR QUOTATIONS

THE Modern Household Appliances Limited, of Montreal, Canada, manufacturers' agents, with agents in all the principal cities of the Dominion, will send a representative to the national convention of the R.S.E.S. for the purpose, among other reasons, of making new contacts.

A large volume of business has been done in the past by this company, and the Canadian market today is a fast growing one, absorbing an increasingly larger supply of materials.

UNIVERSITY EXTENSION COURSE IN REFRIGERATION

A UNIVERSITY Extension Course in household and commercial refrigeration will be started by the Massachusetts State Department of Education Nov. 5. Sessions will be held Friday evenings, at the Massachusetts Institute of Technology, with John G. Praetz, service manager, Liquid Carbonic Corp. and formerly instructor in mechanical engineering at M.I.T., as instructor. The course consists of eight lectures in two parts. Part 1 considers household and commercial refrigeration units, both electric and gas types, from the viewpoint of the installation and serviceman, with instruction on the design, operation, installation, service and service adjustments of the various types of refrigeration on the market. Large colored charts and lantern slides will be used.

BLYTHE *Consider* **BLYTHE** *your Stock Room*

Immediately available to supply your refrigeration and air conditioning supplies—wholesale only.

PARTS A complete line of standard parts carried in stock at all times
TOOLS Everything you need to do a better and faster repair job
SUPPLIES The best there is on the market. Write for catalog

At Chicago----
Nov. 3-5—Mr. Blythe
wants to personally greet his many friends who have become acquainted with the Blythe organization through the medium of the complete Blythe Catalog.

H. W. BLYTHE CO., 2334-38 S. Michigan Avenue, CHICAGO

Part 2 is devoted entirely to commercial refrigeration, but does not include ammonia or carbon dioxide systems. Subjects treated will be unit, multiple, duplex and bi-temperature; mechanical and electric controls; also, water coolers, ice cream coolers, beer coolers and cooling systems, high humidity cooler units; trouble shooting, with diagnosis and correction.

S S S

FEDDERS CHICAGO BRANCH IN NEW QUARTERS

MR. MARC SHANTZ, Chicago Branch Manager of the Fedders Manufacturing Co., announces the removal of his quarters to 112 N. Green St., Chicago.

This move, according to Mr. Shantz, was necessitated through the need of more space. A larger stock and more office space has been found necessary to meet the increased demands for service from the company in the Chicago area.

The new office may still be reached at the original telephone number—Monroe 4221.

S S S

FLARE NUT WRENCHES

THESE wrenches have a decided advantage over the ordinary end wrench for flare nut work. They cannot slip and injure the soft metal nuts. The cutaway head

NEW TYPE DOUBLE BROACHED FLARE NUT WRENCH

allows space to pass the wrench over the tube or shaft and onto the nut. The jaws are especially designed to give maximum strength to this type of wrench and to prevent spreading of the jaws. The double broached hexagon opening makes it easy to get nuts tight even when there is very limited room for handle movement.

These wrenches are made in thirteen different sizes, including the four sizes most generally used in refrigeration work—¾ inch, ⅞inch, 1 inch, and 1⅛ inch.

Snap-on Tools, Inc., Kenosha, Wisconsin, will be very glad to mail complete information regarding these tools, and also copy of their new 136-page catalogue without obligation.

MOTOR BRUSHES
BEARINGS & BUSHINGS
When ordering give complete nameplate reading, or send samples
COME TO HEADQUARTERS

Brush kit prepared especially for refrigeration service—a handy selection of brushes for ready replacement—also special kit of refrigerator motor bearings.

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SCOOP! RESCO SOLE DISTRIBUTOR FOR HINSDALE IN CANADA!
If you live in Canada, order Hinsdale Refrigeration Tools from RESCO—sole Distributor! Also exclusive agents for: Tecumseh Products, Peerless Coils, Temprite Coolers, Ranco Controls, American Injector, Mills Condensing Units. Get RESCO'S quick service on refrigeration supplies!
REFRIGERATION SUPPLIES CO., LTD., LONDON, CAN.
FREE Catalog

MIDWEST SUPPLY JOBBERS ORGANIZE

THE refrigeration supply jobbers of Iowa and surrounding territory held a meeting at the Fort Des Moines Hotel on September 20th. Mr. J. O. Harvey of the National Refrigeration Service of Sioux City, Iowa, was elected Temporary Chairman of the group and Mr. E. L. Bengston of the Republic Electric Company of Davenport, Iowa, was elected Temporary Secretary.

It was decided that the name of the society should be the "Midwest Refrigeration Supply Jobbers' Credit Association." The names of the companies and their representatives belonging to this new organization are as follows:

Mrs. Austin Jones, United Supply Company, 207 North 16th Street, Omaha, Nebraska.

Mr. R. F. Winterbottom, Winterbottom Supply Company, Commercial & Miles, Waterloo, Iowa.

Mr. Jas. O. Harvey, National Refrigeration Service, P. O. Box No. 1228, Sioux City, Iowa.

Mr. C. W. Helstrom, Globe Machinery & Supply Co., 205-211 West Court Avenue, Des Moines, Iowa.

Mr. C. W. Dennis, Refrigeration Supply Company, 359 Wesley Way, Sioux City, Iowa.

Mr. J. S. Kimmel and Mr. E. L. Bengston, Republic Electric Company, 114-118 E. First Street, Davenport, Iowa.

The next meeting is to be held in Chicago during the Refrigeration Service Engineers Society National Convention.

\$ \$ \$

NEW SHAFT SEAL

THE Syntron Company, of Homer City, Pa. have just perfected and placed on the market, a new Shaft Seal of unique design for eliminating the leakage of gases and liquids around the rotating and oscillating shafts of compressors and pumps.

This new seal has for its main sealing and wearing surface, an anti-friction and self-lubricating compound insert in bearing metal of the finest quality.

The sealing head of bearing metal with its anti-friction insert is held firmly against the shoulder on the rotating shaft to be sealed by strong spring pressure which also

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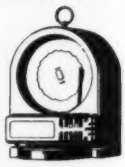
● Here is a reliable recording thermometer at a price you can afford. Only $18! Designed particularly for service work. You must see it to appreciate its exclusive features; to learn why it is easy to operate. Hundreds use Practical thermometers to check refrigerators, air-conditioners, etc. Find out all about this instrument. Ask your jobber or write to us.

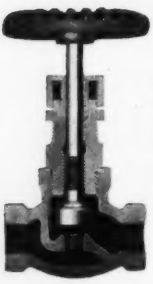


SEND FOR TRIAL OFFER

Mail this ad with your letterhead to get latest folder on this amazing instrument and 15 Day Trial inspection offer.

PRACTICAL Recording Thermometer

Practical Instrument Co., 2717G No. Ashland, Chicago



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for Ammonia Service

Our semi-steel valves have new features: the improved swivel seat, *new bonnet construction* and pressure cap lock. All valves contain the highest grade metallic packing.

Descriptive literature mailed upon request.

for Methyl-Freon-Sulphur

Water valve body is made of cast bronze and has renewable rubber composition seat. Noiseless in operation. The frame is so designed that adjustments can be made easily. Operating range from 50 to 150 lbs.

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Manufacturers of Krupp Valves for Mechanical Refrigeration

expands the packing rings, sealing the bearing head to the housing.

This seal has proven as effective and leakproof on worn and scored shafts as on new shafts—the soft anti-friction insert quickly seating itself in all inequalities on the surface of the shoulder of the shaft.

A distinctive feature of the seal is the self-centering ring in the sealing head.

Quietness of operation by elimination of chattering is assured through the compressed packing rings that grip the seal head up close to the bearing face.

The major advantages according to the manufacturer of this new seal are; the entire elimination of leakage over a long period of time without adjustment, self-seating action, self-lubrication and self-centering.

The seal is supplied complete, ready for installation, including the seal nose piece, packing rings, compression spring, seal housing and gasket.

Catalog information may be had upon request.

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Do you know your **LABOR and MATERIAL costs?**

Use service forms ENDORSED and AUTHORIZED by:

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433 N. Waller Ave. Chicago

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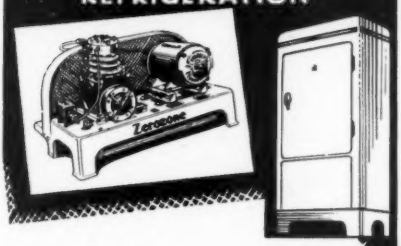
Zerozone Household & Commercial REFRIGERATION



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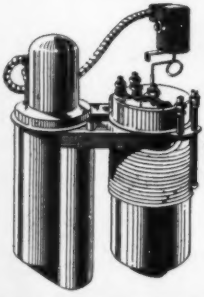

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LIQUID COOLER

SEE IT IN OPERATION

Booth 3—R.S.E.S. Convention

a source of quick profits for the service man—all refrigerants.

COMMERCIAL COIL & REFRIGERATION CO.
459 North Artesian Avenue, Chicago, Illinois

. . SEE YOUR JOBBER OR WRITE DIRECT . .

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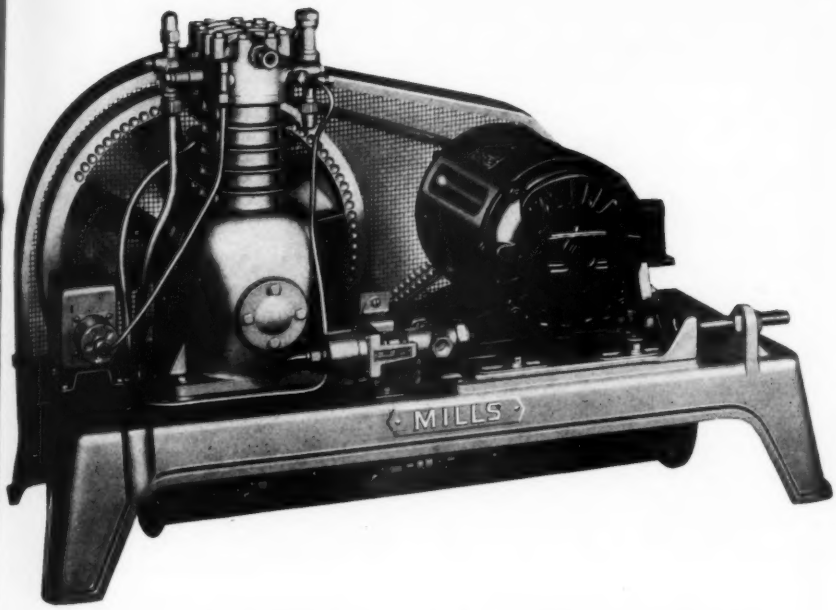

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Mills Novelty Company is not the *oldest* concern in the refrigeration business, nor the *largest*. The only claim we make is this: WE SELL THE BEST COMPRESSOR. Figure it out for yourself: the *best* compressor is made by *somebody*. That "somebody" might be the oldest manufacturer, or the largest manufacturer, or it might be *us!* You may forget the remarkable reputation made by the Mills Compressor in the past three years—but you *can't* forget or ignore our open challenge to any other compressor maker: *We will submit Mills Compressor to any competitive test with any other make of compressor on any terms or standards the competitor wishes to set.* Prove for yourself that MILLS IS BEST! And if any other manufacturer thinks otherwise — whether he be large, small, old, or young — let him stand up now and say so.

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. . . . . *It Pays To Use*
PERFECTION
REFRIGERATION PARTS

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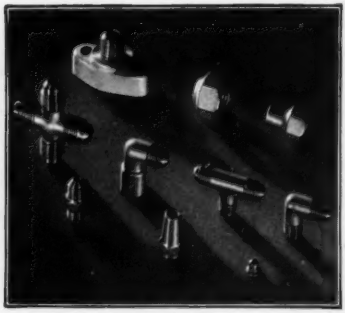

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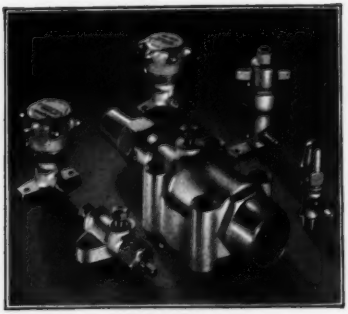

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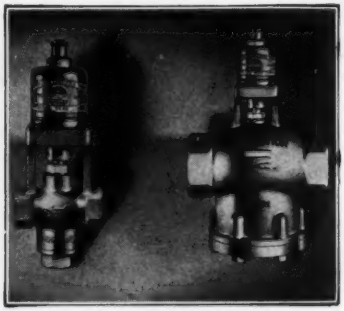

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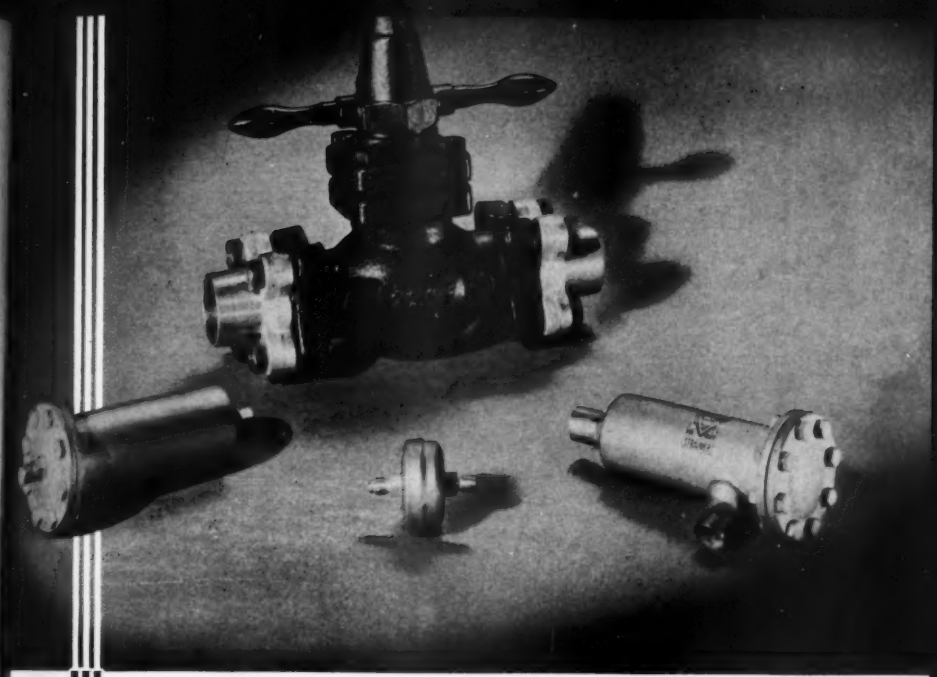

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